The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Strike

THIS week again we go to press on the eve of a meeting which is to decide the action of the miners. Events, however, have moved quickly during the past week, and moved in a direction unfavourable to a national strike. The wise withdrawal of the railway and transport men is an act of sense and loyalty to the nation, and ensures that the forces of the Triple Alliance are not to be ruthlessly used to hold the community at ransom. One cannot resist the feeling that the great trade union machine was in danger of being captured by extremists for their own uses, and the men themselves appear to be realising that so used it may become as great a menace to their own liberty as to that of the community as a whole. There is, of course, no quarrel between the nation and legitimate trade unionism, and it is a reassuring sign that the great body of sane trade unionists understand this. What is wanted now is a rational attitude on the part of the miners, and a sympathetic and tactful attitude on the part of the Government. With good judgment and good feeling on both sides, and a common sense of responsibility for national welfare, there should be no insuperable obstacle to a reasonable settlement.

Enemy Chemical Factories

THE report issued for private circulation some time ago of the British Mission to Rhineland chemical works is now supplemented by the report of another British Mission appointed to visit enemy chemical factories in the occupied zone engaged in the production of munitions of war in February, 1919. The report itself is, no doubt, a bulky document and to some extent confidential, but the introduction, published last week and substantially reproduced in this issue, gives a good general view of the position disclosed by the inquiry. Appointed by the Army Council, the members have naturally paid attention to the military aspects of chemical industry, and some use may be expected to be made of their conclusions in the coming discussions on the Key Industries Bill. They find that except for the employment of the strong method for the manufacture of picric acid on a large scale, and the separation of the isomers of mononitrotoluene (elaborated in the dyeworks before the outbreak of war), the German methods for the manufacture of explosives were not superior, and in some cases were inferior, to the methods in use in the big national factories erected in England during the war. It is doubtful, they state, whether efficiencies in any of the German works reached the very high levels attained in the best English factories. As regards the production of poison gases, the most notable fact is that the bulk of the German plant had been in existence prior to the war for the manufacture of dyestuffs or pharmaceutical products, whereas, in this country, there was practically no apparatus available that could be utilised for making the gases used during the later period of the war. The figures for the output of explosives and gas show the great military value of the factories of the I.G. Combination.

Perhaps the most interesting chapter is the comparison of the present position of chemical industry in Great Britain and Germany. It is frankly admitted that, at the time of the armistice, Germany was left with a chemical industry of greater productive capacity than before the war. The general impression, however, was that the technical practice in Germany factories was not markedly superior to that obtaining in England at the end of the war, and in some respects it was inferior. The main source of the strength of German chemical industry lies in its organisation and the large scale of its production. The rapid growth, however, of British chemical industry during the war, the Report concludes, "proves that it can compete successfully with Germany, provided that reconstruction is undertaken on a sufficiently large scale." That, perhaps, is the most hopeful sentence in the whole document.

The British Mission consisted of Brigadier-General H. Hartley (Controller of the Chemical Warfare

Department of the Ministry of Munitions), Mr. F. H. Carr, Capt. A. C. G. Egerton, Lieut. H. G. Greenwood, Dr. H. Levenstein, Mr. W. Macnab, Mr. A. W. Tangye and Mr. S. I. Levy (secretary). It was accompanied by delegates of the American, French, Italian and Belgian Governments. It spent a fortnight (February 1 to February 14) in visiting important chemical and explosives works in the British zone, and the chief chemical works in the French and Belgian zones. The usual procedure was, first, to have a general view of a factory in order to obtain an idea of its lay-out and pre-war capacity, and of the way in which this had been utilised and extended for war purposes. Afterwards the Mission divided into three sections in order to get details of war production as follows:—

Initial products (*e.g.*, sulphuric acid, nitric acid, ammonia, chlorine, caustic soda): Mr. Tangye, Lieut. Greenwood and Capt. Egerton.
Explosives: Mr. Macnab and Mr. Levy.
Poison Gas: Dr. Levenstein and Mr. Carr.

In some cases considerable difficulty was experienced in obtaining accurate details of manufacture, especially as regards substances which have a peace value, and the information must therefore be accepted with some reserve. The members were, however, able to obtain valuable information as to the methods of manufacture of explosives and poison gas and of the initial products necessary for their production, and to form a clear impression of the military value of German chemical industry.

It is rather curious to note that the report of a British Mission should be available for use in the United States before it is published in this country. The text of the report appeared in full in the Hearings before the U.S.A. Committee on Ways and Means, House of Representatives, on H.R. 2706 (the original number of the Longworth Bill for the protection of the U.S.A. coal-tar chemical industry), and was reproduced in American chemical journals some time before it was issued here as a White Paper by the Army Council.

Annual Reports on Applied Chemistry

An opinion we have gathered from casual remarks dropped by members of the Society of Chemical Industry is that of all the literature published by the Society none is looked forward to with more eagerness than is the issue of the volume of Annual Reports on Applied Chemistry. The volume for the fifth consecutive year has recently become available, and as usual it is a monument to the energy and thoroughness of its editor, Mr. T. F. Burton, and the thirty or more special contributors who were selected by the Committee. In one direction a notable advance has been made, and that is in connexion with the date of publication. Mr. Burton is at least setting a commendable example to those Government Departments whose reports generally appear anything from six to nine months after the end of the period to which they refer, and it must have required no mean effort on his part to collate, revise, index, and publish his volume within the space of three months. This early publication must, we believe, be a very important factor in influencing sales, for the purchaser naturally wants to be assured that the technical opinions he is paying for have not materially suffered through the lapse of time. It may be recalled that in these columns when the previous volume made its appearance last June we strongly urged that publication should be speeded up so that the volume should be available in March.

From the point of view of bulk the 1920 volume is almost identical with its immediate predecessor, and an exactly similar series of technical subjects is covered. A glance at the names of the individual contributors leads one to suppose, however, that there is some difficulty in persuading recognised authorities to make the necessary sacrifice of time which a comprehensive review demands, for rather more than 50 per cent. of those who were engaged in 1919 reappear in the 1920 volume. Perhaps, however, these hardened contributors have set up such a standard of excellence that the uninitiated hesitate to follow them, or, on the other hand, the publication committee may feel that they cannot afford to risk a declension from their present standards by dealing with unknown quantities. Providing arrangements can be made, however, the argument is in favour of the introduction of different, if not new, blood each year, for the same subject may be given an entirely different complexion if viewed from another standpoint. Apart from any of the domestic arrangements, however, the principal point to bear in mind is that the ordinary textbook (which necessarily can only be revised every three or four years) is very prone to lag behind current developments, and the Annual Reports provide a source of up-to-date facts wherewith the textbook information may be supplemented. In an early issue we hope to review the volume in more detail.

More Technical Studies

No chemist or technologist, however oppressed by taxation and anxious to see expenditure reduced, will question the wisdom of publishing the records of the valuable factory organisation and production undertaken on behalf of the Government during the war. Under the Ministry of Munitions four volumes were published—two on costs and efficiencies for H.M. Factories, one on the statistical work of the Factories Branch, and one on the preliminary studies for H.M. Factory, Gretna. Their value has never been questioned. Now, under the joint auspices of the Ministry of Munitions and the Department of Scientific and Industrial Research appears the first volume of a new series, "Technical Records of Explosives Supply, 1915-18." This deals with the "recovery of sulphuric and nitric acids from acids used in the manufacture of explosives," particularly with the processes of denitration and absorption.

Already, therefore, we have the nucleus of a valuable technical library, based on an exceptional experience not likely in our time, at least, to recur. In many respects the war took us by surprise, and the results attained by our chemists and chemical engineers, working under great pressure and hampered by many difficulties and limitations, constitute a memorial to chemical initiative and knowledge that will not soon be forgotten. It would have been a cause for lasting regret if no permanent record had been preserved of

what was done in the form of chemical research, design and layout of plant, and general works organisation. Fortunately we have not to lament an oversight, but we congratulate the departments concerned on the thoroughness with which they are making available our factory experiences during the war for the use of students, research chemists and works managers. Mr. Macnab, who is primarily responsible for these publications, was well equipped for the work by qualities of thoroughness, exactitude and patient industry. He has handled the subjects with ample knowledge, and each volume bears evidence of his constant desire to make it as widely and as practically useful as possible. It is not, of course, claimed that systems, rather hurriedly adopted to meet war emergencies, were always the best, but they have a distinct experimental value, and are well worth the patient labour expended on the preparation of the records.

In addition to the volume noticed this week, others, we understand, of equal, if not greater, interest are almost ready for publication, and may be expected shortly. If we have been a little slower and more reticent than our American friends in making known the results of our scientific war work, we may fairly claim to have done the work with rather more thoroughness. When the series is complete the editor and his colleagues, together with the authorities under whom they have worked, will be entitled to our congratulations and gratitude.

The Reparation Muddle

So far no official ruling has been published respecting the amount of duty which a British importer has to pay on goods imported from Germany under the Reparations Act. The duty is nominally fixed at 50 per cent. of the value, but considerable confusion has arisen, owing to the vague definitions of the Act, as to how the value is to be estimated. Section 3 (1) says that the value is the amount the importer would pay for the goods, including the duty. The popular reading of this is that the value is the invoice value of the goods, say £100, plus the duty on that amount at 50 per cent., £50, making the total value £150. On that basis the duty payable would be £75.

The Customs authorities have not taken this view at any stage, but have given two widely different interpretations. First they held, and confidently stated this in answer to inquiries, that where the invoice value was £100, and that sum was paid in full to Germany, the importer would be liable for duty in the sum of £50. This interpretation, it is understood, has now been abandoned, and Section 3 (1) has to be read as governed by the official reading of Section 1 (1). The latter states that on importation of any goods from Germany under the Act, the importer shall pay 50 per cent. of the value to the Commissioners of Customs, and the Act assumes that the remaining 50 per cent. will be paid to and be accepted by the German exporter. If, however, the importer pays Germany the full invoice price of £100, the Customs will assume that Germany has only received the half to which she is entitled under the Act, and another £100 will have to be paid by the importer to the Customs. In short, whatever sum is paid to Germany, that sum will be held to be only half the value of the goods, and an equal amount must be paid by the importer to the Customs.

It is understood that the delay in announcing a decision on the point is due to the reference of the matter to the Crown's legal advisers. It is, however, open to question whether their ruling, based on a particular interpretation of Section 1, can be reconciled with the terms of Section 3, and there is a possibility of yet another Sankey judgment. In any case it seems clear that the duty on what business is done must come from the British importer. Our information, however, is that, owing to the uncertainty of the position, trade with Germany has come practically to an end.

The Calendar

April		
25	Royal Society of Arts: "Recent Applications of the Spectroscope and Spectrophotometer to Science and Industry," by Samuel Judd Lewis. 8 p.m.	John Street, Adelphi, London.
26	Sheffield Association of Metallurgists and Metallurgical Chemists: "Internal Stresses in Tool Steel," by J. Neill Greenwood	Sheffield.
26	Royal Photographic Society of Great Britain: Ordinary meeting: Memorial Lecture on the Life and Work of the Late Sir William de Wiveleslie Abney, by Chapman Jones. 7 p.m.	35, Russell Square, London.
27	Royal Society of Arts: "Research in the Wool Industry," by Sir J. P. Hinchliffe. 8 p.m.	John Street, Adelphi, London.
27	Textile Institute: Annual General Meeting.	16, St. Mary's Parsonage, Manchester.
27	Society of Chemical Industry: Nottingham Section	Nottingham.
28	Concrete Institute: "The Elastic Modulus of Concrete," by Professor F. C. Lea. 7.30 p.m.	Westminster, London.
28	West of Scotland Iron and Steel Institute: Annual general meeting	—
28	Royal Society: Papers by Professor H. Lamb; Dr. W. Rosenhain; W. Hartree and Professor A. V. Hill; F. N. Newman; T. L. Ibbs; B. N. Chakravarty	Burlington House, Piccadilly, London.
29	Manchester Literary and Philosophical Society: Chemical Section. 7 p.m.	—
29	Society of Chemical Industry (Liverpool Section): Annual meeting: "Mustard Gas." by Sir William J. Pope. 6.15 p.m.	Liverpool.
29	Royal College of Science Union: Chemical Society: "Elements," by F. R. Goss; "Some Industrial Applications of Electro-Chemistry," by E. H. Hart	Royal College of Science, South Kensington.

Books Received

NITRATE FACTS AND FIGURES, 1921. By A. F. Brodie James. London: C. Mathieson & Sons. 5s. net.

British Mission to Enemy Chemical Factories

Comparison of British and German Methods

Last week the Army Council issued as a White Paper (Cmd. 1137, 2d.) the introduction to the Report of the British Mission appointed to visit Enemy Chemical Factories in the occupied zone engaged in the production of munitions of war in February, 1919. The substance of the introduction is given below, and the matter is referred to in our Editorial Notes.

German Methods of Production

Explosives

THE factories in the occupied zones which were inspected by the Commission can hardly be considered as representative of the explosives industry of Germany. Only a very small proportion of what must have been the total output of propellant explosive was manufactured in these factories, and though considerable quantities of high explosive were produced, these could not have been so great as the amounts made by the big explosives works situated outside the occupied zones. The chief high explosive made was trinitrotoluene, but picric acid and dinitrobenzene were also made in quantity. Most of the nitro-explosives were mixed with ammonium nitrate, in the proportion of 60-65 per cent. of the former to 40-35 per cent. of the latter.

The manufacturing methods employed in the factories visited were on the whole very similar to those in use in this country. The chief differences observed were those arising from the shortage of materials in consequence of the blockade, as for example, the employment of plant for the manufacture of nitric acid from ammonia instead of the nitric acid retorts erected on such a big scale in England, the utilisation of paper crêpe for preparation of nitrocellulose, and the employment of glycol in place of glycerine.

The processes employed for the manufacture of trinitrotoluene, dinitrobenzene and dinitrochlorbenzene differed in detail only from those in use in England. Nitrobodies were almost invariably handled in the liquid condition, and the method of granulating or pelleting by running the liquid nitrobody into water, with agitation, almost universally employed in the manufacture of T.N.T. in England, was found to have been employed in one case only, viz., the manufacture of dinitrobenzene and dinitrotoluene at Ludwigshafen. The transport of nitrobodies of high melting point in the liquid condition in steam-jacketed tank wagons was employed whenever the distances permitted, and steam-heated pipes, through which the liquid substances were blown by means of compressed air, were used on all the works visited. Nitrators and separating vessels were seldom provided with bottom exits, but were built to allow of the discharge of the contents by means of compressed air.

The general methods of nitration employed differed little from those in use before the war. Trinitrotoluene was invariably made by the three-stage method, fresh mixed acids being generally employed at each stage; extraction of the spent acids by means of the nitrobody next to be nitrated was carried out, but had not been developed to the extent that the detoluation operation was carried in England. The separation of metanitrotoluene from the mixed mono-isomers by fractional distillation in vacuo, carried out at Leverkusen and Höchst, allowed of the production of a relatively pure trinitrotoluene without later purification; neither the sulphite nor the alcohol purification was employed in any of the factories visited. Chlorbenzene was nitrated direct to dinitrochlorbenzene, and naphthalene direct to dinitronaphthalene. Tetryl was also obtained from dimethylaniline in one operation, as in England. Dinitrobenzene was obtained from benzene by nitration in two stages.

Economy in the use of acid did not in general appear to have received so much attention as in England. At Höchst a mixed acid containing a high proportion of sulphuric anhydride was used for the trinitration in T.N.T. manufacture, the waste acid being fortified for use in the dinitration stage, and waste acid from the nitration of dinitroanisol to trinitroanisol at the same works was fortified for subsequent nitrations, but with these exceptions no special care seems to have been taken to reduce the quantities of acid in circulation to a minimum. This may have been due to the fact that in the manufacture of dye intermediates, with which alone most of the factories were occupied before the war, it was customary to departmentalise on rather rigid lines, the acid departments being kept entirely separate from the nitration departments.

In the manufacture of picric acid at Dormagen, the strong acid method was employed, the plant being adapted to use phenol or dinitrophenol indifferently as a raw material. This method was in use in England for the nitration of dinitrophenol, and large scale experiments were carried out at Queen's Ferry to test its suitability for the nitration of phenol, but most of our picric acid was made by the older weak acid method. At Dormagen, cast-iron nitrators were employed, the picric acid being separated from the spent acid by vacuum filtration through filter beds of porous stone. These porous stone filters were in general use throughout the picric acid plant at Dormagen, and were also used in other factories for the separation of dinitrochlorbenzene and trinitroanisol from the waste acids. The separation of tetryl from its waste acid was effected at Troisdorf by use of centrifugals, which were lined with cloth woven of nitrocellulose fibres.

Denitration of the spent acids from the manufacture of the nitro-explosives was effected partly in columns, partly in stills lined with acid proof tiles and heated by means of internal steam coils; the latter method seemed to have little to recommend it. The lining of the stills was excellent; the use of vessels rendered acid proof in this manner was frequently observed.

The manufacture of propellant explosive was carried out on established lines, as far as could be judged from the relatively small installations situated in the occupied zone. The method for recovery of ether-alcohol vapours by means of sulphuric acid at Troisdorf was well worked out, and a recovery of 60 per cent. was said to have been effected, but this claim must be accepted with reserve. The use of glycol in place of glycerine is noteworthy, but does not appear to have been very satisfactory.

On the whole it may be said that, except for the employment of the strong acid method for the manufacture of picric acid on a large scale, and the separation of the isomers of mononitrotoluene (which was elaborated in the dye works before the outbreak of war), the German methods for the manufacture of explosives, as exemplified in the works situated in the occupied territories, were not superior, and in some cases were inferior, to the methods in use in the big national factories erected in England during the war. The fact that none of the plants visited were in operation, and the difficulty of obtaining accurate data with regard to quantities and yields, makes comparison difficult, but it is doubtful if efficiencies in any of the German works reached the very high levels which were attained by the best English factories.

Poison Gases

As the bulk of the gas used by the enemy had been made in the factories in the occupied zone, the Mission was able to get very full information both as to the method of manufacture and the scale of production.

The most striking feature was the fact that the bulk of the plant employed for the production of poison gas had been in existence prior to the war for the manufacture of dye-stuffs or pharmaceutical products. A certain amount of new plant had been erected, but this consisted mainly of standardised apparatus which had been used previously for peace production.

Another point worthy of note was the way in which the different stages of the manufacture had been allocated among the various factories according to the suitability of the available plant for particular operations. Thus, the production of thiodiglycol for the manufacture of mustard gas was carried out entirely at Ludwigshafen, where plant was in operation prior to the war for the preparation of ethylene and ethylene chlorhydrin, the thiodiglycol being sent to Leverkusen for conversion into mustard gas. In the same way several factories worked together in the preparation of the diphenylarsinic acid required for the production of diphenylchlorarsine.

A comparison of the facilities for the production of poison gas, existing in this country and in Germany at the outbreak of war, shows the great disadvantage at which we were placed in this respect. In this country, where the manufacture of organic chemicals had not developed before the war, there was practically no apparatus available which could be utilised for making the gases used during the later period of the war, and consequently all the plant required had to be designed and constructed, many months elapsing before output could commence. In Germany, where suitable plant already existed, supplies of a new gas could be manufactured in a much shorter time, and production on a large scale was greatly facilitated, thus illustrating the great military value of a well-organised dye and fine chemical industry.

Summary of Output

Initial Products

The principal materials concerned are ammonia, nitric acid, sulphuric acid and chlorine, and it was on the output of these that the war production of chemical munitions depended. The expansion of output by the factories of the I.G. Combination during the war is shown by the following tables :—

AMMONIA (METRIC TONS NH_3 PER DAY).

	1914.	1918.
Oppau	25	250
Merseburg	Nil	400
Total	25	650

NITRIC ACID (METRIC TONS 100 PER CENT. ACID PER DAY).

	1914.	1918.
Leverkusen	56	180
Höchst	150	375
Oppau	?	100
Ludwigshafen	40 (?)	40
Weiler ter Meer	12	24
Total	258	719

Oppau can now produce 500 tons of nitric acid daily and still supply sufficient ammonia for the oxidation plant at Höchst.

SULPHURIC ACID (METRIC TONS 100 PER CENT. ACID PER DAY).

	1914.	1918.
Leverkusen	340	470
Höchst	224	280
Ludwigshafen	275	410
Weiler ter Meer	48	60
Total	887	1,220

Meister Lucius & Brüning have also erected a large new plant at Höchst which has not yet started and was not examined.

The Bayer Company has erected at Dormagen a large vitriol plant equal to 250 tons per day.

CHLORINE (METRIC TONS PER DAY).

	1914.	1918.
Leverkusen	20	20
Höchst	4	8
Ludwigshafen	13	35
Total	37	63

Explosives

No arrangements appear to have been made prior to the outbreak of war to utilise the resources of any of the dye factories for war purposes, and on mobilisation their chemists were called up for military service. After the battle of the Marne the Government realised the need for expanding the output of explosives, and most of the chemical works were producing small quantities by the end of 1914. The demands made on them increased during 1915, but it was not until 1916 that plant was laid down to assist in the enormous production of explosives required by the Hindenburg programme. Most of the big extensions of the synthetic ammonia and of the nitric and sulphuric acid plants date from this time, many chemists being released from the Army and the scientific staff of some of the works being augmented. Standardised plant used for the manufacture of dyes was converted for the production of explosives with remarkable speed ; for instance, at Leverkusen a T.N.T. plant producing 250 tons per month was put into operation in six weeks.

Poison Gas

At first chlorine and phosgene were the main requirements, but afterwards a variety of organic substances were employed, all of which were made by the factories of the I.G. Combination. Many of these substances were new and difficult to prepare, and rapid production was only possible owing to the speed with which the peace organisation of the dye factories could be utilised for this purpose. When the Government wished to introduce a new gas, a conference of the various firms was held at Berlin, to determine how the manufacture should be subdivided in order to use existing plant to the best advantage. For instance, the initial stages of the manufacture of mustard gas were carried out at Ludwigshafen and the final stage at Leverkusen.

The following table shows the production of gas and intermediate products in the various factories visited :—

OUTPUT OF FINISHED POISON GASES (from various Works).

—	Factory.	Monthly Output Metric Tons. Average.	Monthly Output Metric Tons. Maximum.	Manufacture began.
1. Chlorine ...	Leverkusen ...	600	—	Prior to war.
	Höchst ...	240	—	,,
	Ludwigshafen	860	1,261	,,
2. Phosgene ...	Leverkusen ...	—	30	,,
	Ludwigshafen	288	621	,,
3. Diphosgene ...	Leverkusen ...	—	300	June, 1915
	Höchst ...	139	266	Sept. 1916
4. Chlorpicrin ...	Leverkusen ...	—	200	July, 1916
	Höchst ...	45	101	Aug. 1916
5. Xylylbromide ...	Leverkusen ...	—	60	Mar., 1915
6. Bromacetone ...	Leverkusen ...	—	20	Early in 1916
7. Bromacetone / Bromethylmethylketone	Höchst ...	19	45	April, 1915
8. Phenyl carbylamine chloride	Höchst ...	65	124	March, 1917
9. ββ.—dichlorethysulphide (Mustard Gas)	Leverkusen and one other factory	—	300	Before July, 1917
10. Diphenylchlorarsine.	Höchst ...	150	300	May, 1917
Diphenylcyanarsine.	A.G.F.A. ...	—	—	—
11. Ethyldichlorarsine.	Höchst ...	78	150	Aug. 1917
12. Dichlormethylether.	Höchst ...	26	51	Sept. 1917
13. Dibrommethylether	Höchst ...	7	29	April, 1917

OUTPUT OF INTERMEDIATE PRODUCTS FOR POISON GAS MANUFACTURE.

Finished Gas.	Intermediate Products.	Total Output (Metric Tons).	Place of Production.	Destination of Intermediate Products.
Phenyl carbylamine dichloride	Phenyl Mustard Oil	Not obtained	Kalle ...	Höchst
ββ.—dichlorethyl sulphide (Mustard Gas)	Thiodiglycol	7,026	Ludwigshafen	Leverkusen and one other factory.
Diphenylclorarsine	Phenyl arsinic acid	1,600	Ludwigshafen	Unknown — Probably Leverkusen.
		1,200	Kalle ...	,, — Probably Leverkusen.
	Diphenyl arsinic acid	4,800*	Leverkusen	Probably A.G.F.A., Berlin.
			Note.—In addition Höchst produced 3,000 tons of diphenyl chlor- and cyan-arsines from own intermediates.	
Ethyldichlorarsine	Ethyl arsenious oxide	840	Ludwigshafen —Höchst.	

* Estimated from capacity of plant.

Military Importance of German Chemical Industry

The figures for the output of explosives and gas show the great military value of the factories of the I.G. Combination. Although no arrangements had been made to mobolise them at the outbreak of hostilities, they were rapidly converted to war purposes, thanks to their highly trained personnel, and

the great technical resources of their peace organisation. In the future it is clear that every chemical factory must be regarded as a potential arsenal, and other nations cannot, therefore, submit to the domination of certain sections of chemical industry which Germany exercised before the war. For military security it is essential that each country should have its chemical industry firmly established, and this must be secured as one of the conditions of peace; as otherwise we are leaving Germany in possession of a weapon which will be a permanent menace to the peace of the world.

The key to Germany's war production of explosives was the Haber process for the production of ammonia from atmospheric nitrogen. It is significant that large-scale production by this process only began at the end of 1912, and that in the early part of 1914 great pressure was put on the Badische Company to increase its output. During the war, owing to the extensions of the Haber plants at Oppau and Merseberg, Germany has become independent of foreign countries for her supplies of ammonia and nitric acid, substances indispensable for the manufacture not only of high explosives but also of fertilisers for food production. Without such a process Germany could not have made the nitric acid required for her explosives programme, nor obtained fertilisers for food production after the supply of Chile saltpetre had been stopped by our blockade, and it is probable that she could not have continued the war after 1916. In the event of another war, we might be cut off from supplies of saltpetre, while Germany would be independent of them.

The resources of the German dye industry are of no less military importance. Most of the gases employed towards the end of the war were complex organic substances, none of which had been made previously except in small quantities, and some of which were prepared for the first time during the war. Gas warfare will undoubtedly continue to develop in this direction, and in the future organic substances will be employed which we do not know to-day. The use of gas will always offer great opportunities for surprise in military operations, and the experience of the present war has shown that rapid production of a new gas is essential if the surprise is to be effective. Any country without a well-developed organic chemical industry will be severely handicapped in this respect.

Present Position of Chemical Industry in Great Britain and Germany

As it is clear that the military strength of a country depends to a large extent on the development of its chemical industries, it is necessary to review the present condition of these industries in Great Britain and Germany.

At the outbreak of war this country was competing successfully with Germany in the heavy chemical trade (acids, alkalis and bleach), but the organic chemical industry (dyes, pharmaceutical products, &c.) was almost entirely in German hands. British organic chemical works were much smaller than their German competitors, and all British chemical works were much more specialised, dealing separately with heavy chemicals, dye substances and pharmaceutical products. They were not linked up in a combination such as that now existing in Germany. The big German firms produced heavy chemicals, dyes and pharmaceutical products in the same works. This method of production has many advantages, as much transport is avoided and by-products can be utilised direct, owing to the large variety of chemicals made in one factory. The range of production on a large scale also enabled the German works to crush competition in any one branch by selling below cost price, without any material reduction of their annual profits. It was stated by the Badische Company that the financial arrangements between the companies in the combination prevented losses falling on any individual member of the combine. Thus, for instance, if a large profit were made by the production of synthetic ammonia at Oppau and Merseberg, the combination could afford to sell dyes below cost price.

During the war considerable progress was made in this country in producing dyes and pharmaceutical products for which we had previously been dependent on Germany, but this expansion was made at a time when the energies of most firms were directed to producing munitions, and when it was difficult to obtain suitable plant, and considerable assistance will be necessary in order to protect our organic chemical industry before it is sufficiently strong to withstand German competition.

After the war even the heavy chemical industry may be seriously threatened by the Haber process for producing ammonia, which gives Germany a cheap independent source of nitrogen compounds. As the deposits of saltpetre in Chile, on which the world is at present mainly dependent, are of limited extent, and will before long be insufficient to meet the demands, the economic and military value of the Haber process which offers the cheapest method for the fixation of atmospheric nitrogen is obvious.

In spite of the shortage of materials and labour in Germany, the buildings erected during the war in all the works visited were of a permanent character, and the contrast between the peace time value of the extensions of chemical plant made in Germany and Great Britain since July, 1914, is very striking. In this country all the nitrate needed during the war was obtained from Chile, and the bulk of the plant erected was for the production of sulphuric acid or for explosives; consequently, it will be of little use for peace purposes, as the capacity for sulphuric acid production will be much greater than the consumption. Germany, on the other hand, had to rely on synthetic nitrate, and therefore a large part of her capital expenditure was on ammonia and nitric acid plant, which will be a valuable asset in the future. Her sulphuric acid plant was not increased to the same extent as ours, owing to the existence of large oleum plants in dye factories, and as it was possible for her to use existing plant for the manufacture of explosives, she avoided to a large extent unproductive expenditure for this purpose.

Thus, at the time of the armistice Germany is left with a chemical industry which has a greater productive capacity than it had before the war. The general impression, however, gained by the Mission was that the technical practice in the factories visited was not markedly superior to that obtaining in England at the end of the war, and in some respects it was inferior. The main source of the strength of the German chemical industry appeared to lie in its organisation and in the large scale of its production, which had been made possible by the ample financial support it had received.

By means of these advantages Germany had been able to cheapen production and establish a strong economic position, and to secure the development of the industry by the large sums devoted to technical research. However, the rapid growth of British chemical industry during the war proves that it can compete successfully with Germany provided that reconstruction is undertaken on a sufficiently large scale.

Annual Meeting of Salt Union, Ltd.

Mr. G. H. Cox, chairman of directors, presiding at the annual general meeting of the Salt Union, Ltd., at Liverpool, on Tuesday, said so far as the prospects of 1921 in the Indian market was concerned, a complete change had occurred. The competition of German crushed rock salt from Hamburg had been much in evidence, while there had been excessive shipments of solar salt from Port Said and the Red Sea. The immediate outlook for a remunerative Indian trade was far from promising. The Salt Union, however, were still shipping to Rangoon, in spite of German and other competition. The prospects of many of their export markets had been adversely affected by German competition. This was notably the case in Scandinavia. German salt had even penetrated to the other side of the Atlantic. Fortunately German crushed rock salt did not suit every consumer. This successful German competition was due to the abnormal position of the German exchanges, and they could only hope that the legislation now being promoted by the Government would speedily be passed, and that it would be successful in counteracting this unfair advantage. Canada, Australia and New Zealand had taken steps to check the importation of German salt. With regard to labour, the future of the manufacture of the Salt Union was dependent upon a greatly lessened cost of production.

The death has occurred at 18, Brooklands Terrace, Swansea, of Mr. William Brown, for forty years secretary to the Pacific Patent Fuel Co., Swansea, of which (until its recent acquirement by a new company) he was latterly a director. Mr. Brown was 76 years of age.

German Reparation Duty

THE Chemical and Dyestuff Traders' Association state :—

"The ruling of H.M. Customs given last week to the Association—namely, that a British importer could pay the full invoice value direct to the German exporter, and that where the invoice value was £100 the amount payable to H.M. Customs would be £50—has been amended to the ruling that the duty payable by the importer must equal the amount paid to Germany. No official announcement has yet been issued, though the Association applied for a formal ruling on April 8th, but it is understood that it may appear at any moment. The decision appears to depend on the interpretation of Section 3 (1), which states that 'the value of any imported goods shall for the purposes of this Act be taken to be the amount which the importer would give for the goods, including the sum payable to the Commissioners under this Act.'

"It was at first thought that this meant the invoice value of the goods paid to Germany, plus the duty payable by the British importer. On this view the duty on goods invoiced at £100 would be £50 at the rate of 50 per cent., and that was the original ruling of the Customs. On fuller consideration it has been decided that whatever is paid direct to Germany must be regarded as merely 50 per cent. of the value and consequently an equal amount must be paid to H.M. Customs. This presumably is the opinion of the Crown legal advisers, though doubt is expresssed as to whether it can be reconciled with the terms of Section 3 (1) defining the value of goods. Section 1 (1), however, distinctly provides that the importer shall pay to the Commissioners of Customs a proportion not exceeding 50 per cent. of the value of any German goods imported, and this apparently is the ground for ruling that whatever sum Germany receives must be regarded as only 50 per cent. of the value."

50 per cent. Payable to British Customs

Under Section 1 of the German Reparation (Recovery) Act, importers of German goods are required to pay to the Commissioners of Customs "such proportion of the value of the goods, not exceeding 50 per cent., as the Treasury may from time to time prescribe." It is now announced that the Treasury has decided that the proportion so payable shall until further notice be 50 per cent. This decision is subject to any order which may be made under Section 5 of the Act, which empowers the Board of Trade to reduce or vary the proportion in certain cases.

Customs Procedure Explained

In the House of Lords (April 20) Viscount Peel, Chancellor of the Duchy, in answer to Lord Emmott, said that two or three variations of the rule as to the payment of duty under the German Reparation (Recovery) Act on the landing of German exports in this country had been allowed by way of concessions to traders in respect of bargains entered into before March 8, but there had been no change in the rule itself. Under the Act goods from Germany ordered and paid for now were liable to a levy equal to the 'amount paid to the German exporter, the levy being 50 per cent. of the value of the goods. The value was defined as the amount which the importer paid for the goods including the sum payable to the Commissioners. He understood that no agreement had yet been arrived at between the Allied Powers as to the division of the money paid by British importers under the Act, but the question of the distribution of the pool, as he might call it, would be discussed at the next conference. Italy, Japan, Greece, Serbia, Rumania, Portugal, Siam and Liberia had promised to initiate legislation similar to the Reparation (Recovery) Act; the French Bill on the subject had been passed by the Chamber, and the Belgian Bill had become law.

In reply to a supplementary question he added that cases in which the Customs authorities had charged 100 per cent. upon the value of imports from Germany were those in which the importers into this country had paid the full value of the goods to German exporters, and the Customs officials, assuming that the Act had been followed and that only one-half of the value had been paid, had charged a duty equal to that amount.

What the Importer Actually Pays

Captain WEDGWOOD BENN (House of Commons, April 18) asked the President of the Board of Trade whether it had been decided that in cases where a British importer agreed with a German seller to pay the 50 per cent. charge under the German Reparations (Recovery) Act he was to be charged not 50 per cent. of the amount actually paid to the German, but 100 per cent. of that amount; and whether he regarded this procedure as an appropriate method of making Germany pay.

Sir P. LLOYD-GREAME said the Act provided for a levy of 50 per cent. on the value of the German goods, this being defined as the amount which an importer would give for them, including the amount of the levy. It followed that for every £100 that the importer paid to the German in cash, he was required to pay £100 to the Customs. He certainly considered that the Act was an appropriate instrument for the enforcement of reparations.

Board of Trade Orders

An Order of the Board of Trade under the German Reparation (Recovery) Act reduces the proportion of value payable to the Customs from 50 per cent. to 5 per cent. in the case of any article in respect of which it is proved that such article, or the principal parts or contents thereof, cannot be produced and worked elsewhere than in Germany, and that such article is produced in and exported from Germany to the United Kingdom by a company or companies producing similar articles in Germany and exporting such articles therefrom to the United Kingdom before March 8, 1921, and in which not less than 90 per cent. of the capital is, and was before that date, owned by British nationals.

The Board have issued a further Order exempting from the Act any article imported into the United Kingdom before May 15 the physical possession of which and property therein had passed to a foreign Government other than the German Government before March 8, and which is imported for the purposes of being treated and sold on behalf of such foreign Government.

British Trade with Canada

To the Editor of CHEMICAL AGE.

SIR,—In my letter on British Chemical Trade with Canada in the issue of March 19 the sentence occurs, "Canada buys from the United States in goods of all kinds over nine million dollars worth in the year." Nine million should, of course, have been nine *hundred* million. This is nearly three million every working day. Every man, woman and child in Canada buys a hundred dollars (more than twenty pounds) worth of goods from the States each year. I should think one half of the amount might go to Britain instead.

It is distressing to see Britain convulsed with strikes. Can the sane people in England not convince those who wish to do as little work as possible for the largest pay obtainable, that this way lies destruction? Time was when the British workman prided himself on doing better work than any other in the world; now he seems to glory in doing less work than any other. Soon there will be no work for him to do and no pay. Cannot the sane people carry on an active propaganda and not leave all the training of the working man in the hands of agitators paid by other nations to overthrow the supremacy of the British Empire?—I am, etc.,

Queen's University, JOHN WADDELL.
Kingston, Ont., April 6.

Septic Gas from Sewage

To the Editor of THE CHEMICAL AGE

SIR,—I was interested in reading about Septic Gas from sewage, in your issue of January 8, 1921, under the heading, "A New Use for Sewers." It seems that the septic tank system of Parramatta, New South Wales, Australia, has been successful in supplying septic gas for industrial purposes. Can you please inform me where I can secure literature dealing with this subject of the production of septic gas from sewage. You have evidently had access to some pamphlet or article on the subject, for you say in conclusion, "It is stated that the gas is odourless, smokeless and dry, and can be stored in holders in the usual way.—Yours, etc.,

Warton Bank, EDWIN KAY.
Kirkham, Lancashire, April 7.

[The process for obtaining gas from sewage was introduced by the Septic Gas Company of Australia. The chief representative of the company in this country is Mr. W. A. Winchester, of St. Anne's Park, Bristol, who will, no doubt, be glad to furnish full particulars.—ED. C.A.]

Technical Records of Explosives Supply (1915-1918)

No. 1.—Denitration of Spent Acids

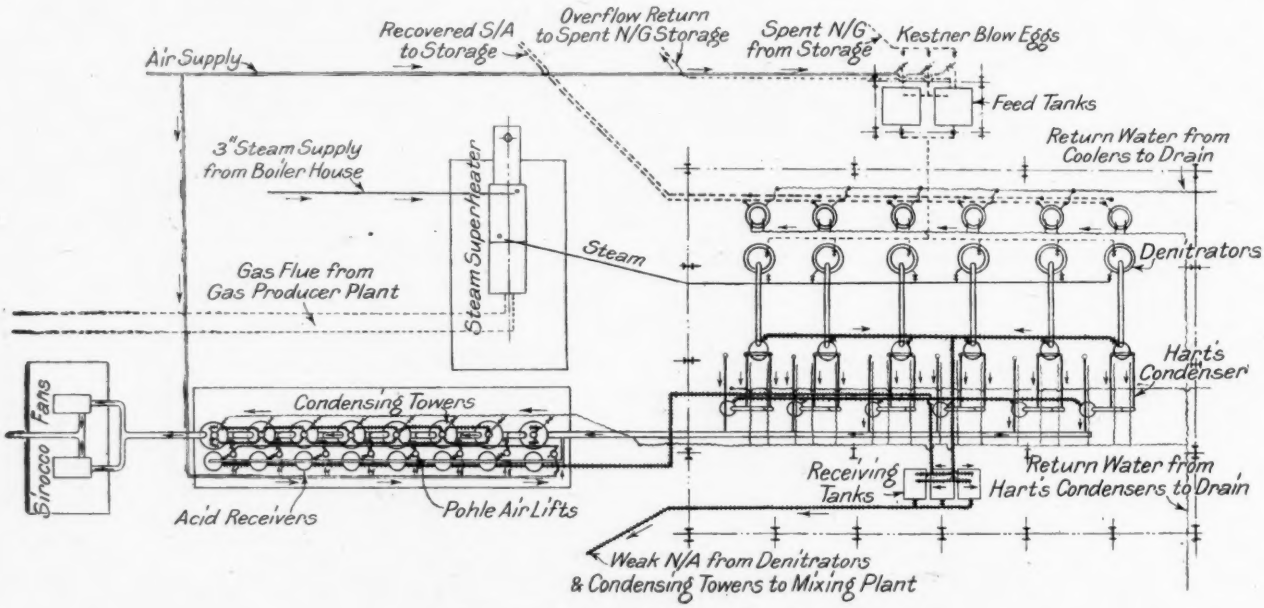
The work referred to below is issued by the Ministry of Munitions and the Department of Scientific and Industrial Research, and is entitled "Technical Records of Explosives Supply (1915-1918)*: No. 1, Denitration of Spent Acids." It is published by H.M. Stationery Office at* 12*s.* 6*d. net.*

To the valuable volumes already published dealing with aspects of the work of the Department of Explosives Supply—Report on Costs and Efficiencies for H.M. Factories, Report on the Statistical Work of the Factories Branch, and Preliminary Studies for H.M. Factory, Gretna—has now been added the first of a new series: "Technical Records of Explosives Supply" (1915-1918). This deals with "Recovery of sulphuric and nitric acids from acids used in the manufacture of explosives: denitration and absorption." It exhibits the same comprehensive and thorough methods of treatment which distinguished the previous volumes, and the very carefully prepared text is liberally illustrated by technical charts. We have already acknowledged the almost indispensable value of these records, and Mr. W. Macnab, who has charge of their compilation, is to be congratulated on the first number of the new series, the general aim of which is to make available results of scientific and technical value relating to work done at or in connexion with some of the National Factories during the war. Further volumes of the series are now in the press and will, it is expected, shortly be issued.

The present work is too minute in its detail for quotation, but the introduction, written in the editor's careful and modest style, gives a general idea of its scope and purpose, and is reproduced below:—

"The recovery of sulphuric and nitric acids, together with the degradation products of the latter, from the 'spent' acids resulting from various nitration processes constitutes an item of the greatest importance in the manufacture of explosives and other nitro-compounds. When the large proportion of acids used to nitrated product produced is taken into consideration, the important bearing which economy in acid consumption has on the efficiency of production and cost of the finished product is at once apparent. Also, although the percentage of nitric and nitrous acids remaining in the spent acids is relatively small, yet such enormous quantities had to be treated during the war that the reconversion of these acids into nitric acid of a usable concentration has been a matter of the utmost importance from an economic point of view.

"Much valuable research work has been carried out at the various explosive factories controlled by the Department of Explosives Supply in the endeavour to procure the highest possible plant efficiencies, and it is hoped that some of the information and experience thus obtained may be of value and interest to others confronted with similar problems. The information available, although covering a very wide field and gathered from many sources, is very scattered, being in many cases the result of investigations bearing on difficulties arising from purely local conditions, and much of it is unsuitable for inclusion in a report of this kind. Certain salient points, however, have emerged as regards plant design and operation, and these will be presented as far as possible in the form of a connected account.



GENERAL PLAN OF DENITRATION PLANT.

"Broadly speaking, the treatment of spent acids containing sulphuric acid together with varying percentages of nitric or nitrous acids may be said to consist in the removal of the nitrogen acids in the form of weak nitric acid and oxides of nitrogen, leaving a sulphuric acid of suitable composition for concentration. This is effected either by direct heating of the spent acid or by the use of live steam, the procedure adopted depending on the class of acid to be dealt with, the end products in each case being sulphuric acid on the one hand, and nitric acid on the other, each of varying strengths.

"The composition and properties of the spent acids dealt with vary considerably, depending to a great extent upon the properties of the explosive from the manufacture of which the acids result, and the methods of treatment are modified accordingly. Thus, whilst trinitrotoluene (TNT) and nitroglycerine (NG) spent acids are treated in almost identically the same manner, the procedure in the case of nitrocellulose manufacture is quite different. In the first case, the nitric and nitrous acids are removed in the form of nitric acid and oxides of nitrogen by means of blowing steam counter-current

to a stream of spent acid descending a vertical quartz-packed tower, and in the second case the nitro-acids are removed by distillation in stills with or without the addition of sulphuric acid, as in the ordinary retort practice for the manufacture of nitric acid. Thus the methods of treatment may be conveniently divided into two sections :—

(1) Denitration by steam in columns or 'denitrators,'
(2) Denitration by distillation in 'stills,'

the first only of which is described in this publication.

"In each case the liberated nitric acid is recovered by a suitable condensing arrangement, and the oxides of nitrogen are converted to nitric acid in absorption towers. The sulphuric acid after cooling is pumped to storage tanks and is ready for concentration.

"It is not proposed to refer in detail to the large amount of experimental work which has been accumulated during investigations on the denitration of sulphuric acid or on the recovery of oxides of nitrogen in the form of nitric acid, as these subjects have been dealt with from the theoretical standpoint very fully in the current literature. The following description is therefore devoted chiefly to the design, construction and operation of denitration and absorption plants. Apart, therefore, from a brief reference to the theoretical considerations governing the processes employed no attempt is made to review the extensive researches which have been carried out in the pure and applied chemistry of the subject.

"As most of the investigations were carried out in connexion with the denitration of TNT spent acids, a full description of what may be termed a standard plant for this purpose is given, reference being made at the same time to any deviations from such practice at other factories, as well as to the more important developments which they may have brought about. It must be borne in mind throughout, however, that much of the work has been carried out under the most trying circumstances, nearly all plants being subjected during the first few years of the war to varying degrees of overload, and consistent results were not always forthcoming. Again, many lines of research were prompted by purely local conditions, and the need for extracting just one more ounce from an already sorely overtaxed plant."

The various processes are described in great detail—the chemical theory and method of denitration, the reactions taking place in the denitrator, the process of absorption, reactions taking place in the absorption towers, conditions for the most efficient absorption, and a full account of plant design and operation, with a very complete collection of drawings.

British Chemists' Visit to Canada

The President's Message

SIR WILLIAM POPE, President of the Society of Chemical Industry, in a message to the members respecting the visit of the Society to Canada next August, says .—

"During the critical period through which all branches of the chemical industry are at present passing, when old markets are falling away and must be replaced by new ones, it is more than ever essential that British industrial chemists should seize every opportunity of gaining acquaintance with the conditions which prevail in the British Dominions and abroad; only by personal visits and by the establishment of new friendships and fresh business relationships can our members hope to be able to raise our chemical industries to the position indicated for them by the history and the geographical environment of these islands. Our Canadian and American friends have intimated their desire to furnish uncommonly extensive facilities for the inspection of works concerned with every branch of chemical industry, and it is certain that similar facilities cannot be granted to private individuals travelling alone apart from an official party such as is now being formed. The Council therefore desires to urge the members of our Society to make every effort to accept the generous invitation extended to us by our transatlantic friends; we are convinced that the maximum benefit to our Society and to the chemical industries of Great Britain, of Canada, and of the United States can only be derived by the attendance of a large British party at the coming annual meeting.

Protection of Fine Chemical Industry

Dr. Stephen Miall's Views

IN his monthly letter to *The Journal of Industrial and Engineering Chemistry* Dr. Stephen Miall discusses the prospects of legislation for the protection of the British fine chemical industry and other key industries.

"There is talk," he writes, "of introducing a bill for the protection of the fine chemical manufacture and, in particular, the manu facture of synthetic drugs. It is by no means certain that such a bill will be so acceptable as the Dyestuffs Bill. Many of the special arguments in support of the latter do not apply to the manufacture of fine chemicals. Moreover, the fine-chemical manufacturers have not hitherto made the opportunity or the organisation to render to the community services comparable to those rendered by the dye makers. Broadly speaking, fine chemicals have here been made by small firms with either insufficient ambition or insufficient capital to create that large enterprise necessary to supply this country with a wide range of fine chemicals and research reagents of guaranteed purity. Whether this is now the occasion and whether—assuming it to be such—it will be seized, no one can say. The Dyestuffs Bill is no precedent.

"But our Free Trade arguments will be put to the proof in connexion with the German indemnity. How much we shall get and in what shape it will come seem to me minor matters in comparison with the great question : Will it do us any good to get an indemnity ? I suppose Germany has a small quantity of gold, but not enough to count where thousands of millions are involved. Now that she has lost Alsace and Lorraine and undertaken to send to France coal to replace the supply from the French coalfields so stupidly destroyed by the Germans, she has not an enormous surplus of raw materials to export, or of foodstuffs. We have taken her ships and incidentally caused short time in English shipyards. So if she pays at all, it looks as if she will pay in manufactured goods. Now, in old days, if we took £20,000,000 of goods from Germany we paid for it by sending out to her (or some other country) £20,000,000 of British-made goods, and employment was not affected. If we are going to receive, without sending anything in exchange, some huge quantities of German manufactured goods, shall we not increase the unemployment already terrible enough here ? After the Franco-Prussian war it was Prussia, not France, which had a slump in trade. To reconcile war and its consequences, including revolutions, indemnities, depreciation of currency, and so on, with trade and the pursuit of money is a hopeless task and reminds one of a schoolboy with an axe, a glue pot and some fireworks, trying to regulate an eight-day clock. Whatever be does he will spoil the mechanism and one must be thankful if he comes away without the flash, bang, and sting, which are the marks of what juvenile students consider a successful chemical experiment.

"The details of the new Key Industries Bill, which is to protect the manufacturers of fine chemicals, optical glass, scientific instruments, magnetos, and other things, are not yet published, and one hears rumours that the advocates of tariffs and the advocates of importation under licenses are unable to agree upon a common policy. The makers of fine chemicals favour importation under a system of licenses such as prevails in the dyestuffs industry, but the application of this principle to all the objects in the schedule of the Key Industries Bill would be extremely difficult and cumbrous. Recent by-elections here do not point to any considerable departure from free trade."

Society of Public Analysts

THE next meeting of the Society of Public Analysts will be held in the Chemical Society's rooms, Burlington House, on May 4 at 8 p.m., when the following papers will be read :— (1) "Detection and Estimation of Illipe Nut Fat used as a Substitute for Cocoa Butter," by Francis G. H. Tate and John W. Pooley; (2) "Notes and Demonstration on Apparatus for Determining H. ion Concentration," by G. W. Monier-Williams; (3) "A Note on the 'Oil' of Oats," by Ernest Paul; and (4) "Estimation of Potassium in Presence of Sodium, Magnesium, Sulphates and Phosphates," by H. Atkinson.

Oil and Colour Chemists

Commercial Oils of India

AT the meeting of the Oil and Colour Chemists Association on April 14, Mr. F. Hedley Barry read a Paper on "Indian Products of Interest to the Oil and Colour Chemist." Dr. R. S. Morrell (the President) was in the chair.

Mr. BARRY said linseed oil claimed first attention on the part of the paint and varnish trade, and the problems in India at present were mainly in connexion with the extraction of linseed oil. In pre-war days India was one of the greatest exporters of linseed, the amount being about 500,000 tons per annum. There were now 70 oil mills in India (mainly in Bombay), modern plant being in use, and the oil so obtained was quite equal to that obtained from crushing mills in this country.

There were two principal types of crushing plants, one being a pestle and mortar, the pestle being worked by a bullock, whilst in the other case the plant was driven by a 3½-H.P. motor. The trouble with the Indian oil was that the acid content was rather high, about 30 per cent., but the methods were being improved considerably. In this connexion, it was interesting to note that the American manufacturers of plant were very active in impressing upon the Indian people the merits of their plant.

Of other oils, perhaps sesame oil was the principal, and it was of interest to all those concerned with the hydrogenation of fats. The annual value of the Indian product was about 5 million rupees, of which Madras was responsible for 3½ million rupees worth. This oil was largely imported into Europe and 90 per cent. went to France. One reason for the enormous European consumption was that this oil formed a compulsory constituent of margarine.

Another oil, somewhat allied to sesame oil, was ground nut oil. Its sale, however, was being affected, as most seeds were, by the fact that France was pushing the sale of ground nuts obtained from her own Colonies.

The Rarer Oils

One of the rarer oils was mowra oil, and it was becoming of great interest because of its content of chocolate fat. There was some confusion in naming these rarer oils, and it behoved us to be very careful in dealing with them, as the names varied according to the part of India they came from. Tung or china wood oil was increasing in use and if it could be obtained from India it would be of great value. At present it was in the experimental stage at the hands of the Agricultural and Forests Department, and there was reason to believe that a species of plant could be grown to give this oil.

Indian turpentine had been the subject of a lot of papers, but most of the work had been done under the auspices of the Government. There were several species of plant and the Indian Government had taken considerable interest in it. The resins from the Government factories had a specia stamp and were very much used in the East. During the war, when they were compelled to use Indian turpentine in India, it was found that with a little trouble a very satisfactory article could be produced. The production in India was estimated at 20 million gallons a year, which would be more than sufficient to supply the whole of the home consumption and leave some for export. The quantity of resin produced was about 20,000 tons per annum. The objection was that the resin has the curious effect of causing paint to set up even when there were no driers present, but apart from this it was admitted that the Indian turpentine was quite as successful as the American.

Coal Tar Products

With regard to coal and coal tar, India had many very interesting points. Its production was only seven million tons per annum, but that was the second largest in the British Empire, and next to England. The great point of interest was the possibility of recovering the by-products. Incidentally, the great difficulty seemed to be in the erection of a central refinery. It was estimated that there were 8,000 tons of coal tar that were not being refined properly and if these were refined India would be able to supply something like 2,000,000 gallons of benzol which would be about two-thirds the present consumption of petrol in India. The possibility of recovering the by-products carried with it the recovery of coal tar and the manufacture of dyes in India.

One of the points of difficulty to those who wished to exploit Indian coal was that there was no market for the superfluous sulphate of ammonia. At present 3,000 tons were produced per annum and 2,000 tons were exported, but an improvement might be effected if the question of economical artificial manuring were taken up.

India produced about 98 per cent. of the world's output of shellac. The remaining two per cent. came from some of the other eastern countries, mainly Siam, and that went to India in the form of stick lac and was there worked up into various forms.

The adulterants in shellac were a very difficult problem to deal with, and the American Government had now laid down definite standards of examination. The British Government had been approached on the subject, but was rather inclined to think it was a matter for manufacturers to settle among themselves.

Pigments

The lecturer pointed out that the red ochre from the Central Provinces and Madras had been used for centuries and contained from 96 to 98 per cent. iron oxide. The most interesting pigments were white lead and zinc white. Burmah was fortunate in that she possessed both zinc and lead ores. The white lead produced in India was exported to the extent of 1,000 tons a year during the war, but the quantity was less now; nevertheless, this was an industry which would undoubtedly grow. Very large zinc refineries were being built in Burmah and the production of zinc white was a distinct possibility. Sublimed white lead was also a possible manufacture.

Manganese was next dealt with. This, said the author, was not consumed in enormous amounts in the paint trade, but India exported 180,000 tons per annum to England and 100,000 tons to the United States, France and Germany. He did not think the paint trade need fear being short of driers.

The Indigo Trade

After mentioning that graphite was found in Ceylon, Mr. Barry referred to the Indian indigo trade which was an extremely important one before the introduction of synthetic indigo. During the war, however, we were not able to get all the synthetic product required and the cultivation of the natural product was pushed in India for all it was worth. As a result, the area under cultivation was increased by 250 per cent. over that previous to the war, but that proportion had now fallen considerably. One of the great benefits of the war, however, was that considerable attention was given to the cultivation of indigo and it had been found, as the result of many experiments that it was possible to increase the production and place it on such a foundation that it might be able to hold its own with synthetic indigo.

An interesting discussion followed in which Dr. Morrell, Mr. R. P. L. Britton, Mr. Barry, Mr. Saraiya, Mr. H. Morgan, Mr. Dunster, Mr. W. W. Myddleton and Mr. Shaw took part.

Reinforced Concrete Roof Gutters

WE are informed that Walter Pickering & Son, of Bradford, who specialise in pre-cast concrete work are the patentees and manufacturers of roof gutters of reinforced concrete, made to bolt together in standard lengths varying from 6 ft. to 10 ft., and that during the last two years a considerable quantity of these gutters has been fitted to various classes of buildings (mostly factories), and in every instance they have proved eminently satisfactory.

The sections are designed for lightness and stability, and the difference in weight compared with iron is stated to be so slight as to be of no consequence when taking into consideration the advantages of this type of gutter over metal, especially in industrial areas, where the chemical-laden atmosphere has a corrosive effect upon exposed metal. The firm state that the construction of these gutters is such that they become stronger and harder with age, require no painting and practically no maintenance.

It is claimed that these gutters when once fixed form as permanent a part of a building as the foundation, and the cost, we understand, compares favourably with that of cast iron or lead.

Spectroscopy

Some Recent Applications in Chemistry

ON April 11 at the Royal Society of Arts Mr. S. J. Lewis delivered the first of a series of three Cantor Lectures on "The Spectroscope in Science and Industry." It was 35 years, he said, since Professor Hartley delivered a lecture before the Society on photography and spectroscopy in relation to chemical analysis, in which the principles and construction of one of the earliest models of the quartz spectroscope were described. The present course of lectures might be regarded as a continuation of Professor Hartley's lecture.

He was tempted to explore the wonderful work which the mathematician, the physicist, and the astronomer had carried out by the aid of the spectroscope, but not less fascinating were recent applications of spectroscopy in the chemical laboratory, and it was these which would mainly engage his attention during the lectures.

Dealing with recent work in emission spectra, the lecturer gave a description of the latest type of instrument and of the different arrangement of the photographic plate when using a glass lens compared with a quartz prism. By the use of photographic slides it was shown how three photographs were taken, one being the spectrum of the source of light and the other two of the material being tested, copper electrodes usually being employed. A comparison of the photographs of the spectra then indicated the difference between the spectrum of the source of light and that of the material being tested.

The spectroscope, said Mr. Lewis, held the premier position as a means of detecting and identifying minute quantities of the elements. The spectroscope revealed the presence of a mere trace of an element and this had proved remarkably valuable in many industrial operations. Again, in the analysis of natural waters, a great deal of information had been obtained by means of spectroscopy.

Vacuum Tube Spectra

In his second lecture on Monday Mr. Lewis said that vacuum-tube spectra had received very little attention since 1864 until it was taken up by the late Dr. James Pollock of Dublin. Pollock's researches related to such compound substances as metallic chlorides, which could be volatilised at high temperatures in vacuum, the ultimate object being to study the banded spectra of such compounds.

A description was given of Pollock's original apparatus in which a quartz tube was used, 50 milligrammes of the material to be investigated being heated in this tube and the slit of the spectroscope then being directed towards the capillary tube, a discharge then being sent through the vacuum tube.

Pollock's work might be summarised in the following outline: That in many of the spectra, especially when much vapour is used and no Leyden jar is used, very beautiful bands develop, some of which are entirely new to science, and these will require further study before any general conclusion can be drawn regarding them. They are quite independent of the lines of the spark spectra of the elements and probably owe their origin to the molecules of the compounds under investigation.

During the past few years efforts had been made to explore the extreme ultra-violet region of the spectrum. That was generally understood to be beyond a wave-length of 2,000. In conducting these experiments, two difficulties had presented themselves. First, the necessity for devising special photographic plates, such as would avoid the absorption of the rays of very short wave-length by the gelatine or other film; and, secondly, the necessity for excluding air.

Vacuum Spectrographs

To meet these requirements vacuum spectrographs had been devised. One of these instruments differed very little from the ordinary spectroscope, the main difference being that, beyond the slit was a box or chamber for accommodating the lamp. There was also, in this particular instrument, a small chamber for carrying a tray of phosphorous pentoxide. The optical parts of the apparatus were made of fluorite, which was more transparent to the extreme ultra-violet rays. To get rid of the moisture in this class of instrument, the apparatus was washed out with hydrogen several times.

Another type of apparatus avoided the use of refractive apparatus altogether. The essential parts were all enclosed in a metal cylinder in which a high vacuum and freedom from moisture could be maintained. The spectra were produced by a curved grating at one end of the apparatus, and by this means it was possible to avoid having to adjust the grating for various parts of the spectra. By such apparatus the extreme ultra-violet regions of the spectrum had been extensively explored, and much good work done. For instance, hydrogen, helium, carbon, zinc, calcium, lead, mercury, thallium, tin, cobalt, nickel, iron and aluminium had all been dealt with in this type of reflection apparatus as distinct from the refraction apparatus, and there was good reason for believing that a wave length of 4,500 had been attained.

The long delay between the recognition of X-rays and the production of a spectrum, said the lecturer, was due to the difficulty of making a grating sufficiently fine and free from diffraction. The Rowland grating, with 25,000 lines to the inch, was not sufficiently fine; that would give an idea of the degree of fineness required.

Eventually, however, the idea was conceived of using the grains or atoms of a crystal in order to find the spectra of X-rays, and that idea was put into use in 1912 in an investigation of zinc blende by Friedrich and Nipping. The crystal of zinc blende was placed between the X-ray bulb and the photographic plate, and a very thin crystal placed between the two. The crystal structure was then used as a transmission grating, and in this way a photographic expression was obtained on the plate.

Prof. Bragg, however, later applied the crystal as a reflection grating, and in this form it was now frequently used in the investigation of X-ray or high-frequency spectra. The most brilliant work in this direction was due to H. G. J. Moseley in 1913-14. The feature of this work was that there were only, say, up to four or five lines, instead of a very large number, and this work constituted the most wonderful discovery in spectroscopy of recent times. Indeed, it could be foretold by this means that when the element 36 was discovered, it would have a spectrum of a certain form.

The work involved in the X-ray spectra of ordinary materials was too complicated for it to become common; but it was of the highest importance for determining the crystal structure of certain substances. Prof. Bragg had done an enormous amount of work in this direction, and one interesting negative feature was that cellulose, gelatines and some other substances, which were generally recognised as having no crystalline properties, did not, in fact, exhibit any under X-ray examination.

Mr. Lewis then briefly considered spectrophotometry and absorption spectroscopy. Spectrophotometry differed from ordinary photography in that it referred to the measurement of light of very short wave-length only. The principles of investigation were the same as those in ordinary photometry—viz., the method was one of comparison between a standard and an unknown.

A description of some instruments concluded the lecture.

Liability for Goods

Liverpool Chemical Firm's Claim

IN the King's Bench Division on Wednesday, C. W. Field, Ltd., of Wood Street, Liverpool, claimed to recover from the Keene Co., Gray's Inn Road, London, the price of 5 tons of tartaric acid crystals sold to the defendants, and shipped for Italy.

It appeared that the contract was dated February 12, 1920, for the 5 tons tartaric acid crystals B.P. 3s. 8d. per lb., with cash ex quay Liverpool, for May or June delivery. The goods were shipped on s.s. "Thurso," and arrived at Hull on July 2. Strikes in Italy accounted for the delay. Defendants accepted 1 ton at Hull, and had paid for that amount. They asked that the remainder should be sent forward to Liverpool to the Cunard Wharf. The latter, however, would not take the goods until the ship was named, and plaintiffs said they failed to get instructions.

The question in the case was whether upon the facts of the correspondence that passed the defendants had so dealt with the goods as to be liable for them.

Mr. Justice Roche held that the plaintiffs had proved the acceptance of the goods by defendants, and judgment was entered for the plaintiffs for £1,456, and costs.

Non-Ferrous Metals

Progress of the Research Association

PRESIDING at the meeting of the British Non-Ferrous Metals Research Association in London, Mr. Thomas Bolton expressed surprise at the inadequate support the association was receiving; both from those engaged in the industry and from the users of its products.

On the question of divulging trade secrets, he thought it was reasonable and natural that manufacturers should guard rather jealously such special knowledge as they might have acquired, but, in his view, the function of the association was to investigate and instruct on the fundamental facts and principles underlying their processes, leaving the application largely to the members themselves; in this way there was plenty of scope left for individual practical efficiency, and the manufacturer who attached importance to trade secrets was far more likely to obtain such as would be of value by joining the association, and absorbing all he could from it, than by remaining outside and relying upon his own investigations only.

The first research was that on brass and copper castings, which was taken over from the Brass & Copper Tubes Association in April, 1920, and completed in September, resulting in the issue of a report containing much useful practical information. The research on atmospheric corrosion, which was initiated by the Royal Institution of British Architects and Institute of Metals, had also been transferred to the Association and was being carried out by a strong joint committee. A researcher had been appointed and Professor H. C. H. Carpenter had kindly arranged for the work to be done at the Imperial College of Science and Technology, South Kensington, where the researcher would be under his supervision.

Technical Committees have been appointed to consider and suggest to the council what matters most need investigation, and on their recommendations two further researches have already been put in hand—(1) On the effect of foreign substances up to 1 per cent. in copper; (2) on so-called "nickel-silvers." The former is being conducted at the National Physical Laboratory, under Dr. W. Rosenhain, and the latter is in the hands of Dr. F. C. Thompson at Sheffield University. Collaboration with the Scientific Instrument Research Association in carrying further an investigation which they have made into abrasives and polishing powders is also under consideration.

The work in hand for the current year would cost approximately £2,000, which, with about £2,000 required for administration, would absorb the subscriptions in sight and the Government grant, but it was earnestly hoped that an increase in membership would provide funds for other important problems to be taken up.

Novel Photographic Process

WE are informed by Fuerst Brothers, Ltd., of 17, Philpott Lane, London, E.C.3, that they have placed upon the market a new product by which photographic plates can be developed in yellow or candle light. The chemical is known as "Phenosafranin," and the process is based on a chemical transformation of bromide of silver.

In developing with yellow light, a proportion of Phenosafranin, previously dissolved in hot water, is added to the developer which then becomes bright red, allowing every detail to be observed in the developing process. After developing, the plates are slightly red but the colour disappears during the fixing and washing. The process, it is claimed, can also be used to advantage when developing panchromatic, pinacyanol and pinachrome plates, but in the two latter types a bright red light must be used in place of the yellow.

Fuerst Brothers, we understand, have supplies of Phenosafranin which are obtainable from them in 2 gramme bottles.

Scientific Glass Industry

A telegram from Belcher & Mason, of Birmingham, manufacturers of graduated glass scientific instruments, addressed to the Prime Minister stated: "Suggested import duty on scientific glassware useless. We must close works unless prohibition. Germany will kill the industry at all costs unless prohibition, except under license. Have you forgotten that steel, brass, T.N.T., and all other industries could not in 1914 and 1915 make material without scientific glassware? What will next generation say if you let them down?"

Scientific Workers' Union

Employees' Rights in Patents

AT a meeting of the London branch of the National Union of Scientific Workers on April 14 a lecture was given by Mr. H. E. Potts, M.Sc., of Liverpool, on "The Position of Employer and Scientific Worker in Relation to Patent Law." The President, Professor L. Bairstow, F.R.S., was in the chair.

The lecturer dealt first with the present legal position, the basic principle of which was that in the absence of special contract the invention of an employee, even though made in the time, with the materials and at the expense of the employer, does not become the property of the employer so as to prevent the employee from taking out a patent. There were, however, many exceptions, and the higher the position of the employee, the more likely they were to apply.

Mr. Potts mentioned four principle exceptions, citing cases in illustration: (*a*) The work may be done under specific instructions, in which case the director may claim to be the inventor, and his claim be allowed. (*b*) The work may be considered as a condition of employment and to be included in the duties of the position held. (*c*) The worker may be in a position of special confidence and have access to special information. The case quoted was that of an English agent for an American firm, who attempted to patent in England an improvement on the firm's design. (*d*) There is frequently an agreement in force between firms and their scientific staffs that all patents arising out of work done shall be assigned to the firm. In return some firms give bonuses for successful inventions, others a share of the proceeds or royalties, while it sometimes happens that a firm only claims a free licence and leaves to the inventor all royalties.

Mr. Potts considered that the Union ought to decide what it considered to be a fair agreement, and thought that some form of bonus for successful inventions was of value in stimulating effort in the frequent drudgery of final stages of invention. He suggested that before formulating a policy in regard to inventions of scientific workers in industry, the Union should investigate the conditions prevailing in America and on the Continent, and should confer with some representative body of employers.

An interesting discussion followed in which Professor Partington, Dr. H. M. Atkinson, Dr. J. H. Vincent, Mr. S. J. Duly and the Chairman took part.

Future of British Glass Industry

Inadequacy of Proposed Legislation

THE third annual dinner of the Society of Glass Technology was held on Wednesday at the Hotel Cecil, Dr. Morris W. Travers, the president, in the chair.

Responding to the toast of the evening, proposed by Mr. A. Chaston Chapman, president of the Institute of Chemistry, Dr. Travers said it was now common knowledge that at the outbreak of war this country was wholly dependent upon Germany for supplies of chemical and illuminating glassware. The early days were rather chaotic, and no one really knew what anyone else was doing. Gradually, and as the position became more serious, those interested in the glass industry were drawn together, and in November, 1916, the Society of Glass Technology was formed. It was necessary to bring together the manufacturer, the scientific man, and the practical man in order that any discovery relating to one branch might be applied if possible to another branch. There were 600 of them doing their best in that direction. As to the legislation recently proposed by the Government for the protection of the scientific branch of the industry, the view that the tariffs proposed were wholly unsuitable and inadequate was held not only by the manufacturers but by the scientific and industrial worlds, who were dependent upon supplies of chemical glassware. They took the view that the only assistance which would enable this particular branch of the industry to continue was the total prohibition of all chemical glassware except under licence.

Submitting the toast of "The Glass Industry," Mr. Dennis Herbert, M.P., said that scientific laboratory glass was an essential industry that it was necessary to preserve for our national safety. He would like to see absolute prohibition of imports, except under licence, applied to the most highly developed forms of the glass industry.

Price of Soda Crystals

Another Case of Alleged Profiteering

ON April 15, at the Guildhall, John Charles Mascarenhas, a Portuguese, trading as J. Lloyd & Co., manufacturing chemists and druggists of Broad Street House, was summoned at the instance of the Board of Trade, for having, on the 4th of June last, sold to Salmon & Co., Ltd., ten tons of soda crystals at £14 10s. per ton, which, it was alleged, was a price, after allowing for all charges, and in view of all the circumstances, such as to yield an unreasonable profit. Mr. Warren appeared for the defence.

Mr. H. D. Roome, prosecuting, said defendant had purchased soda crystals from Messrs. Heath & Co., of Liverpool, at £9 10s. a ton, and sold them the same day to J. Salmon & Co. at £14 10s., this being, it was alleged by the prosecution, an extortionate price. After the service of the summons, defendant wrote to the Complaints' Committee of the Profiteering Department of the Board of Trade, sending figures in which he made it appear that he had obtained no more than 20 per cent. profit—even that was too much.

John William Cockill, buyer for Salmon & Co., Ltd., wholesale and retail oil and colourman, of Holloway, gave evidence as to having several transactions with Lloyd & Co., in soda crystals. The invoice for the last ten tons in question was £167 10s.

Mr. Warren: "He had had dealings in soda crystals for a number of years. He bought from Lloyd & Co. in June last because he could not get sufficient from the manufacturers."

"A manufacturer's price is one thing, a merchant's another?" asked Mr. Warren. "Quite," replied witness.

"If we could all buy at the fountain head or source, we should buy cheaper?"—"Yes, there would be no middleman's profits."

"What were you paying for these crystals from other sources, at that time?"—"Anything from £10 to £18 a ton."

A mass of correspondence was put in, other evidence called, and the case was adjourned.

Trade Unions and Ways and Means Resolutions

THE measures suggested to Parliament, through the Proposed Ways and Means Resolutions for the Safeguarding in Industries, have been discussed by the Management Committee of the General Federation of Trade Unions. The Committee considered these questions of protecting industries or trades from the point of view of the whole rather than from the point of view of any section, and unanimously decided that attempts arbitrarily to interfere with the free course of trade would disadvantageously affect British industry and increase unemployment. The Committee expressed opposition to any legislation prejudicial to the geographical advantages which British traders possess, or which add to the difficulties of those engaged in overseas buying and selling.

The Committee protested most emphatically against the growing practice of legislation by order in council and by reference, being of opinion that this weakens the Parliamentary sense of responsibility, and leaves the electors with smaller control over their members, and, through them, of national affairs.

By-Products from Gas

IN an address by the Glasgow Rotary Club on Tuesday, Mr. W. A. Walmsley, manager of the Glasgow Corporation Chemical Works, referred to the financial gain accruing to the Corporation in working up, as against contracting out, the by-products, tar and ammonia liquors, from coal in the manufacture of gas.

The initial operations, he said, were confined to crude distillation, but the results were so successful that 14 months after the inception of the department the whole of the residual products were being dealt with, amounting to 40,000 tons of tar and the equivalent of 10,000 tons of sulphate ammonia. It was only at Provan that refining operations were carried on, and by the end of September they hoped to have there one of the best-equipped chemical works in the country.

It is reported from Prague that an EXPLOSIVES COMPANY there is increasing its capital from 15,000,000 to 30,000,000 crowns, and the Association for the Chemical Industry from 5,000,000 to 8,000,000.

United Alkali Company

Effects of the Trade Slump

SPEAKING on Wednesday at the adjourned twenty-ninth ordinary general meeting of the United Alkali Co., Ltd., Mr. Max Muspratt said that owing to the grave slump in trade, precipitated by the coal strike in October last, it was impossible to tell when demand would recover, or to what extent. In any case, a chemical works could not be stopped or started at a moment's notice, and for a few weeks stocks accumulated rapidly, which had been produced at high costs and for which there was little demand.

At the present moment, he said, they had completely stopped several of the works, and partially stopped others. They had hoped that the transference from the older to the newer processes would have been more gradual, and that various developments would have absorbed most of the workmen, and all of the staffs. But this was impossible in present circumstances, and they had had, with regret, to give notice to a large number of men, and were disbanding some of the staffs. The works that were permanently closed as a result of alterations in process were Henderson's, Mort Liddell's and Kurtz, while large parts of Hardshaw Brook, McKechnie's, and Hebburn would also not restart. Other works which were at the moment idle, were being kept in commission for the present in the case of an early recovery.

On the other hand, said Mr. Muspratt, the overtaking of deferred repairs and the introduction of the newest processes was practically complete, and, in particular, their electrolytic plants were all in perfect order, as was their large power station at Widnes. These changes marked an epoch in the history of chemical industry. For a century the Leblanc process served the world, and by the enterprise and genius of our forefathers placed Great Britain in the forefront of the nations in the heavy chemical industry.

For such demand as they had, they were producing on the best and most economical lines, and a comparatively small increase in demand, which must come as accumulated stocks of general commodities passed into consumption, would put them on a sound basis of profitable manufacture. At the same time, it would be realised that the operation of large and complicated plants on quite inadequate loads was far from satisfactory.

The most important improvement of the company's position in the year was the finding of brine in Widnes; this was not of standard quality, but by a happy chance pre-eminently suited for the process they had installed.

As a result of trial borings, its presence had been suspected for some time, but it was generally believed that it was not suitable for chemical purposes. Having failed to come to terms with the original prospectors, they acquired a property and bored for themselves, with the result that since the beginning of this year they had been able to work electrolytic plants practically entirely on their own brine. This development put them on an equal footing with competitors in any part of the world; indeed, in some ways, in a superior position, as, apart from the absence of brine, Widnes was an ideal centre for the chemical industry.

At the thirtieth annual meeting, held on Wednesday, proposals for the declaration of the following dividends for the 12 months to December 31 last were carried: On the £10 preference shares, a dividend of 7s. per share, less tax, making, with the interim dividend paid in September, 1920, a dividend of 7 per cent. for the year 1920, less tax; and on the £1 ordinary shares a dividend of 1s. per share, less tax, already paid as an interim dividend in September, 1920.

Ferguson Chemical Library

THE extensive chemical library of the late Professor Ferguson is, on the recommendation of its Library Committee, to be acquired by the University Court of Glasgow. The chemical section of the library totals about 11,000, consisting of 9,300 volumes, 1,400 pamphlets and 300 manuscripts. In addition to chemistry, histories of inventions, dyeing and bleaching and glass, there are works on sorcery and magic, evil spirits, &c.

Recent Wills

Mr. S. Bishop, of Birchleigh, Highfield Road, Southampton, Chemist £17,096

Photographic Fair

Review of the Chemical Exhibits

ALTHOUGH a large proportion of the stands at the Photographic Fair (which opened at the Royal Horticultural Hall, Westminster, on April 15, and which closes to-day (Saturday) was devoted solely to photography, there was much there of interest on the chemical side.

Johnson & Sons, Manufacturing Chemists, Ltd., of Cross Street, Finsbury, E.C. 2, had an attractive stand on which was shown a complete range of photographic chemicals, including such developers as Metol-Johnson's, Amidol-Johnson's, Azol and Scaloids. Toners, intensifiers, reducers, and photographic varieties were also displayed, as well as a basin of silver nitrate, showing the growth of the crystals. The exhibit of Johnson, Matthey & Co., Ltd., included samples of potassium chloroplatinite, barium platino-cyanide, gold chloride, silver nitrate, silver ammonium nitrate, silver iodide and silver potassium cyanide.

R. & J. Beck, Ltd., of 68, Cornhill, E.C. 3, were showing the Beck photomicrographic camera, a complete series of Beck lenses and a new electric lamp for the microscope, which, it is claimed, is the most perfect illuminant yet devised, while the White Band Manufacturing Co., Ltd., of Croydon, had an interesting display of their Monomet, Metol and Amidol developers and other chemicals in convenient packets, as well as acid hypo, toners and flash powder. Packets containing samples of M. Q. "Pakoids" were distributed from the stand. Chemical preparations such as Mequin developers, "Acifix" (acid hypo), &c., were shown by J. J. Griffin & Sons, Ltd., of Kemble Street, Kingsway, W.C. 2; Wellington & Ward, of Elstree and 101, High Holborn, W.C. 1, were showing their "Wellington" packet developers, universal metol-quinol, pyro-soda and "Wellington" anti-curling celluloid isochromatic roll films.

A prominent feature in the exhibit of Burroughs, Wellcome & Co. was a photograph of a screen bearing 250 quarter-plate and 5 in. by 4 in. bromide prints, all of which were developed with the contents of a single carton of "Tabloid" Rytol universal developer. The stand of Ilford, Ltd., of Ilford, was showing "Desensitol," a new product by which it is stated a photographer is able to carry out the development of negatives in daylight. Other firms showing photographic chemicals were Marion & Co., 3, Soho Square, W. 1, and Houghton's, Ltd., of 88-89, High Holborn, W.C.1. Lenses of various types were to be seen at the stand of Taylor, Taylor & Hobson, Ltd., of Leicester, Ross, Ltd., of Clapham Common, S.W. 4, and J. H. Dallmeyer, Ltd., of 11, Regent Street, S.W. 1.

Affairs of Philip Keats

Application to Reverse Trustee's Decision

CASES arising out of the recent bankruptcy of Philip (or Phineas) Keats, chemist, of Birmingham (reported in THE CHEMICAL AGE at the time) were heard at the Birmingham County Court on April 14, before Judge Ruegg.

A. Hirschfield and C. T. Appleby applied for an order reversing the trustee's decision in the bankruptcy of Philip Keats, rejecting a proof of debt, and J. T. Davies applied for an order reversing the trustee's decision, and for an order that the proof of debt should be admitted.

After hearing lengthy evidence with reference to the first application his Honour said the appellants succeeded so far as being admitted creditors, but at the same time the trustee was right in saying that the debt must be postponed until the claims of all the ordinary creditors had been satisfied. The trustee must find out what were the amounts which were advanced, what amounts were repaid, and what were the profits which were promised; and then, having come to some figure upon that, he would allow proof for whatever sum he thought right.

Davies's application was then investigated, Mr. Eales (for Mr. Davies) explaining that the trustee had rejected a claim that a sum of £11,742 7s. 7d. was owing to Davies when Keats became bankrupt.

His Honour granted the application, ruling that certain sums should be postponed, the others being allowed to rank for dividend in the ordinary way.

Evaporation and Concentration

Circulation Methods and Appliances

THE ninth of the lectures on chemical engineering arranged by the authorities of the Bradford Technical College was given on April 13 by Mr. J. Arthur Reavell, managing director of the Kestner Evaporator and Engineering Co., Ltd., London, and chairman of the Chemical Engineering Group of the Society of Chemical Industry. His subject was "Evaporation and Concentration," and the address, the first of two on this subject, was illustrated by lantern slides.

After dealing with the objects of evaporation and the methods of producing movement in liquid under treatment, and showing examples of jacketed pans, stirrers and other circulation methods and appliances, he gave examples of early forms of film evaporators and spoke of the difficulties to be overcome through the presence of non-condensible gases and air. He covered all the earlier types of direct-fired and steam-jacketed pans, coil pans and led up to the advent of the vacuum pan.

Mr. Reavell described the modern continuous evaporators, both horizontal and vertical, and pointed out the relative advantages and disadvantages. He explained multiple effect evaporation, showing illustrations of the climbing-effect film evaporator and forms used for the production of solid wood extracts, the production of concentrated caustic soda liquor and of caustic soda in solid form. He also showed a horizontal type evaporator which had made possible the production of solid ammonium nitrate on a large scale during the war.

Chemical Merchants' Affairs

Meeting of Creditors

A MEETING of the creditors of Holder & Son, Ltd., Chemical Merchants, 46, Cannon Street, E.C., was held on April 16 at the offices of the liquidator, Mr. H. C. E. Miller, 11, Old Jewry Chambers, E.C. The liquidator submitted a statement of affairs showing unsecured liabilities £1,686 11s. 4d., and assets £814 0s. 9d., or a deficiency of £872 10s. 7d. The assets consisted of book debts and claims estimated to produce £820 and estimated surplus from securities in the hands of fully-secured creditors £34 4s. 2d. The preferential creditors amounted to £40 3s. 5d.

The liquidator stated that since the preparation of the statement he had received another claim for £1,182 from Mr. J. A. R. McDonald, this being in respect of an indemnity given by Mr. Holder. The claim arose in regard to the supply of soda ash which it was said was not up to the standard when an analysis was taken. Mr. Holder had written a letter offering to give an indemnity, but nothing more had been heard of the matter till that day when the claim had been lodged. It appeared that the company was formed in October, 1919, with a capital of £3,000 of which £1,000 had been paid up. The business carried on was that of chemical merchants and manufacturers. Some claims were at present subject to arbitration proceedings which were going on and the company had a claim against the Disposal Board, this claim amounting to about £580. The liquidator pointed out that there were no liquid assets and everything depended on the investigation of some of the claims. There was no proposal before the meeting and it was eventually resolved that the liquidation be left in the hands of Mr. Miller, a committee of three creditors being appointed to assist the liquidator in the examination of the claims that had been referred to.

Refractories.

AT a meeting of the London Local Section of the Institute of Metals held at 36, Victoria Street, S.W., on Thursday evening, Dr. W. R. Ormandy delivered an interesting lecture on "Refractories."

The lecturer dealt with the importance of the subject and its influence on the development of metallurgical industries generally. The various materials commercially available were briefly touched upon and the nature of the work for which they were fitted was shortly outlined. The general characteristics of fireclays and silicious refractories, from silica bricks down to firebricks made from pure clay substance, were touched upon and the influence of the temperature and time of burning on the physical nature of the finished products was dealt with at some length.

An interesting discussion followed.

Chemical Matters in Parliament

Key Industries Bill

Replying to questions by Captain Wedgwood Benn (House of Commons, April 14), the Prime Minister said, in view of the present industrial situation, it was not possible to name a date for the discussion of the Ways and Means Resolutions relating to the Safeguarding of Industries Bill.

Sir P. Lloyd-Greame said it was not intended to circulate the draft of the Bill before the Resolutions were discussed in the Committee.

Answering a further question by Capt. Wedgwood Benn as to whether the full powers granted under the Ways and Means Resolutions would be embodied in the Bill, when it was introduced, the Prime Minister said he thought they would follow the usual course in that respect. They might take full powers under the Resolutions, but it did not necessarily follow that the Bill would adhere strictly to the lines indicated by the wording of the Resolutions.

Major Barnes asked if the Bill could not be printed and circulated, whether a memorandum could be printed and circulated giving some information about these industries, the number of people employed in them, the wages paid, and the capital invested, in order that the House might have some real idea about the effect of the Bill?

Mr. Chamberlain thought the hon. Member had better wait for the discussion on the Resolutions, when information on these matters could be given. Many Bills—noticeably Finance Bills—had been founded on Resolutions before now, but no such Bill had ever been produced before the House had considered the Resolutions. The framing of the Bill was dependent upon the decision which the House reached on the Resolutions.

Major Barnes (House of Commons, April 18) asked the President of the Board of Trade if the common course of publishing a memorandum on Financial Resolutions would be followed in the case of the Financial Resolution on the Key Industries Bill; and, if so, whether that memorandum would contain any information as to the present condition of the industries to which it was proposed to give protection under that Bill.

Sir P. Lloyd-Greame said the practice alluded to was that which had been adopted in the case of Financial Resolutions (*i.e.*, Resolutions involving expenditure of public money), but not hitherto, so far as he was aware, in the case of Ways and Means Resolutions. He did not think that in the present case there was any necessity to depart from the usual practice.

In reply to Mr. Lyle Samuel (House of Commons, April 20), Mr. Chamberlain said he was not yet in a position to say when the financial resolution on the Key Industries Bill would be put down. The Government were anxious to deal with the matter at the earliest possible moment, and the hon. member knew that but for the changes in the Government necessitated by the unfortunate illness of Mr. Bonar Law and the industrial dispute this measure would already have been introduced.

German Reparations Act

Mr. Lyle-Samuel (House of Commons, April 18) asked the Prime Minister whether his attention has been called to the fact that, as a result of the operation of the German Reparation (Recovery) Act, spelter, sugar, timber, enamel and glassware, toys, dyes, and chemicals were no longer being imported from Germany and that supplies of these articles were being diverted to other countries?

Sir P. Lloyd-Greame said he had no detailed information as to the particular article specified.

Captain W. Benn asked the Chancellor of the Exchequer whether any intimation had been received that the German Government intended to repay their manufacturers the sums deducted by British purchasers of German goods under the German Reparation (Recovery) Act; what sums had been received by the Exchequer under that Act; and what was the quantity and/or value of British goods imported during the period since the Act had been in force, and the quantity and/or value of the goods imported from Germany for the corresponding period immediately preceding the Act.?

Replying, Lieut.-Commander Young said the answer to the first part of the question was in the negative. No part of the receipts had as yet been paid over to the Exchequer, the Act providing that they should be paid in the first instance to a special account. He did not understand the reference in the third part of the question to British goods imported. With regard to goods imported from Germany, the point could best be answered by the figures given below. He was not in a position to give figures showing quantities nor yet figures of actual arrivals. The figures of value of imports registered as consigned from Germany to the United Kingdom during the 12 days from March 20 to 31 were £779,991. The corresponding figures for the first 12 days of April were £395,973.

Sir W. Barton (House of Commons, April 19) asked the Chancellor of the Exchequer whether he was aware that confusion had arisen in the administration of the German Reparations (Recovery) Act, 1921; whether he knew that British merchants had difficulty in interpreting it; what was the duty payable by a British importer in a case wherein a German exporter, doubtful of obtaining any money under this scheme from the German Government, doubled the price of his export, invoicing a £50 purchase at £100; and whether he would state the amount payable to the Customs by the British importer under these circumstances?

The Parliamentary Secretary to the Board of Trade (Sir W. Mitchell-Thomson) referred the enquirer to the reply which was given by the Secretary to the Department of Overseas Trade on Monday to Capt. Wedgwood Benn.

Products Corporation

Sir P. Lloyd-Greame, in reply to Lieut.-Colonel Sir F. Hall (House of Commons, April 18), said that the Products Corporation, Ltd., was registered on January 8, 1921, with a nominal capital of £50,000 divided into £1 shares. According to the memorandum of association, the main objects of the company were to carry on the businesses of dealers in chemicals, chemical manufacturers and agents, coal merchants, colliery proprietors, and iron and steel masters. The directors were W. S. Hopkins, F. Harold Johnson and F. Ronald Remington. The whole of the share capital had been allotted for cash to the three directors. Inquiries were being made as to whether any of such capital had been subscribed directly or indirectly from German sources.

Sir F. Hall asked whether the hon. gentleman recognised the fact that a very large German magnate was supposed to be closely connected with this concern, and did he recognise the necessity of our looking after our own trade, and seeing that Stinnes & Co. did not come here and take the trade which should go to our own people?

Sir P. Lloyd-Greame said he recognised very keenly the necessity of making full inquiries, and inquiries were now being made in every case where a licence under the Non-Ferrous Metals Act was applied for.

Profiteering Act

Captain Wedgwood Benn (House of Commons, April 14) asked the Prime Minister whether it was the intention of the Government to renew the Profiteering Act when it expired in May next?

Sir P. Lloyd-Greame: I have been asked to reply. The answer is in the negative.

Major Barnes asked whether the Government was going to consider the renewal of that portion of the Profiteering Act which provided for the investigation of the action of trusts and combines?

Sir P. Lloyd-Greame said he did not think so. In the Debate on the Board of Trade Vote he stated what was the intention of the Government with reference to legislation of this character. He thought it would be much more satisfactory to allow the Profiteering Act to lapse and to introduce, at the time when it would be required, legislation of a permanent nature.

British Dyestuffs Corporation

In a written answer to Mr. Lyle-Samuel (House of Commons, April 18), Sir P. Lloyd-Greame said he was informed that no extraordinary general meeting had been called of the British Dyestuffs Corporation, Ltd., and therefore the second part of the question, asking whether any instructions would be given as to the casting of the Government votes with regard to the change in the managing directorate of the Corporation, did not arise.

It was agreed at a recent meeting of the University Court of St. Andrews that an announcement of the VACANCY OF THE CHAIR OF CHEMISTRY, St. Andrews, be advertised.

From Week to Week

No NITRATE OF SODA was imported into South Africa during 1919.

The University of Edinburgh has decided to establish TWO SCIENCE DEGREES in mining and metallurgy.

THE PRODUCTION of sulphur, zinc and lead in Italy during 1920 showed an increase on the previous year.

During 1919 the Union of South Africa imported over 5,584 tons of RAW PHOSPHATE from Egypt.

Mr. A. B. BAILEY, of Swansea, has been appointed assistant superintendent for South Wales of the Anglo-American Oil Co.

We understand that Mr. J. M. TALLANTYRE, of Evans, Sons, Lescher & Webb, Ltd., of Liverpool, has recently paid a visit to Spain.

In order to ensure a regular outlet for their small coals, D. Davis & Sons, Ltd., have TAKEN UP A PARTNERSHIP in the Crown Preserved Coal Co., Ltd.

It is reported that, OWING TO THE COAL STRIKE, the five works of the United Turkey Red Co., Ltd., Vale of Leven and Renton, have had to close down.

Dr. E. Imbeaux, of 60, Rue de la Republique, Nancy, is appealing for subscriptions for the purpose of erecting a monument at Dijon in honour of HENRY BAZIN.

Slipping from a motor lorry belonging to Tunbridge & Co., wholesale chemists, Castle Street, Reading, Albert Gale was run over and FATALLY INJURED on April 13.

We understand that Mr. FRANK E. WESTON, who recently underwent an operation, is making a satisfactory recovery and expects to resume his duties shortly.

The death is announced at East Cosham House, Cosham, of Mr. Arnold William Reinold, F.R.S., formerly Professor of Physics at the Royal Naval College, Greenwich.

We understand from Mr. Harold Potts that his recent lectures on "PATENT LAW and CHEMICAL RESEARCH" are to be republished in book form about the end of the year.

The United Artificial Silk Factories Co., of Elberfeld, Germany, reports profits of 81,470,000 marks, against 11,270,000 marks last year, and pays a DIVIDEND OF OVER 70 PER CENT.

At a meeting of the INSTITUTION OF PETROLEUM TECHNOLOGISTS held on Tuesday at the Royal Society of Arts, Mr. Alan W. Dayson read a paper on the "Education and Training of a Driller."

The United States Forest Products Laboratory is stated to have discovered large deposits of a HIGHLY COLLOIDAL CLAY, which is claimed to have exceptional qualities as a loading material for paper.

We regret to hear that Mr. E. BERNARD COOK, of Johnson & Sons, manufacturing chemists, of Cross Street, Finsbury, has been indisposed for some time, and is still too unwell to undertake business duties.

It is reported that RICH SULPHUR FIELDS have been discovered at Kongsvold, Western Norway. They extend over 1,500 square miles, and are estimated to contain eight million tons of excellent sulphur.

The Concrete Institute, 296, Vauxhall Bridge Road, Westminster, S.W.1, have issued a report on the RESEARCH WORK accomplished under the direction of the Institute in the years 1917 to 1919.

Swansea Harbour Trust reports a slight improvement during March in the TRADE OF THE PORT, accounted for chiefly by the first arrivals of oil fuel and crude oil for the Anglo-Persian Co., amounting to 18,000 tons.

A Bureau of Mines report states that there are 415 completed PETROLEUM REFINERIES in the United States, as compared with 373 in 1920. It is further stated that 44 refineries are in process of construction.

One of the veterans of the patent fuel industry, Mr. DAVID MORGAN, of Cardiff, who spent ten years with the Crown Patent Fuel Co., and 41 years with Gueret, Ltd., celebrated his diamond wedding on Saturday last.

PHOSPHATE NODULES have been discovered by the Bureau of Economic Geology and Technology of the University of Texas. These nodules are found only forty feet below the surface in a test oil well near La Costa.

The Union of Producers and Consumers for the Development in France of Synthetic Chemicals, &c., has been officially appointed to distribute GERMAN REPARATION CHEMICALS. The Union states that the Germans are extremely active, and that their output greatly exceeds what was estimated.

Siamese IMPORTS OF CHEMICALS, which amounted to 949,838 kilos, valued at 434,688 ticals in the fiscal year ending March 31, 1918, increased to 1,088,396 kilos, valued at 701,532 ticals, in 1918-19. For 1919-20, however, imports declined slightly, amounting to only 916,425 kilos, valued at 579,609 ticals.

The Government have decided not to proceed with the CENSUS OF PRODUCTION next year. A census in 1923 in respect of production during the year 1922 is in contemplation and should this be decided upon an Order under the Census of Production Acts will be laid before Parliament in the course of the current year.

The death occurred on April 11, at Ellerdale, Moffat, of MR. F. M. HALDANE, who for many years was sole partner of the firm of R. F. Bell & Son, chemical manure manufacturers and grain and feeding stuff merchants, West Bowling Green Street, Leith. Mr. Haldane, who was in his 80th year, retired from the business about sixteen years ago.

Representations have been made to the Ministry of Transport by the Birmingham Chamber of Commerce respecting the heavy increase in TRAFFIC CHARGES ON PITCH in blocks from Scottish creosote stations to England. The complaint is made that the rates are in excess of what the material will bear, and a cessation of the business is threatened.

THE ESTIMATE of the amount required in the year ending March, 1922, to pay the salaries and expenses of the Department of Scientific and Industrial Research, including a grant in aid, the Fuel Research Station, the Geological Museum, including a grant in aid, the Geological Survey of Great Britain and the National Physical Laboratory totals £416,023.

Mr. L. J. Humphrey, secretary of the Federation of British Fruit Growers, is, we understand, resigning his position in order to take up an important post in connexion with the sale and distribution of the NEW PHOSPHATIC FERTILISER which, under an arrangement made by the Government, is to be imported from the Pacific Islands recently owned by Germany.

According to statistics issued by the AMERICAN DYES INSTITUTE of New York, licences were granted by the War Trade Board during February for the importation of 25,289 lb. of dyestuffs from Germany, and 115,411 lb. from Switzerland. Licences were issued for United Kingdom dyestuffs to the extent of 500 lb. and comprised 200 lb. Dianol Fast Blue 2 B, and 300 lb. Durasol Acid Blue B.

The Board of Trade, upon the recommendation of the committee constituted under Section 5 of the GERMAN REPARATION (RECOVERY) ACT, have ordered that articles imported into the United Kingdom before May 15 next shall be exempt from the provisions of the Act, if it is proved to the satisfaction of the Commissioners of Customs and Excise that they are imported in pursuance of a contract entered into prior to March 8 last, and left the place from which they were consigned to the United Kingdom prior to April 8.

A serious accident occurred on Thursday at the lavender and peppermint distillery of Messrs. W. J. Bush & Co. George Davies, a lead burner, in the employ of the Chemical Engineering Works, Hendon, was, assisted by several other men, engaged in "sweating in" the taps of empty spirit drums, when a naked light came in contact with a hole in a drum. There was a rush of flame and a loud bang, and the lid was blown off, knocking Davies down and breaking both his legs. It is surmised that some spirit had accumulated in the drum, which had been lying idle.

The annual review of the TRADE OF INDIA in 1919-20, issued by the Department of Statistics, India, states that, as compared with 1918-19, an appreciable decrease was shown in the total value of imported chemicals, the figures for the two years being Rs.2,49 lakhs and Rs.1,61 lakhs. Increases of quantities imported were reported in acids, alum, ammonia and salts thereof, copperas, caustic soda and sulphur, while carbide of calcium, sodium carbonate and sodium bicarbonate showed restricted importations. The United Kingdom easily headed the list of countries supplying chemicals with 75·8 per cent., followed by Japan, Italy and the United States.

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$$3HNO_2 \gtrless 2NO + HNO_3 + H_2O$$

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Patent Literature

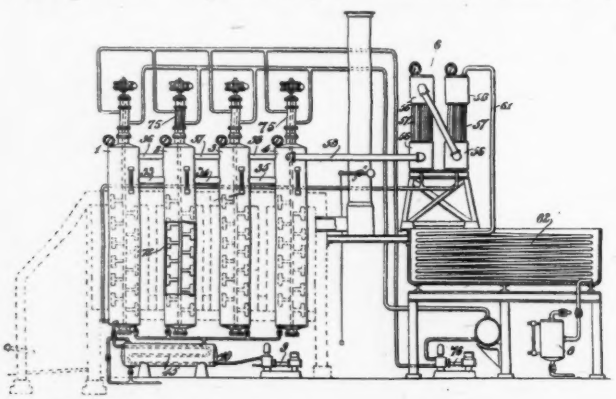
Abstracts of Complete Specifications

160,185. REACTIVE ACID LIQUOR, ALCOHOLS, ESTERS AND THE LIKE FROM OLEFINE HYDROCARBONS, PROCESS FOR THE PRODUCTION OF. E. C. R. Marks, London. (From New Jersey Testing Laboratories, 92, Greenwood Avenue, Montclair, N.J., U.S.A.). Application date, April 22, 1919.

Petroleum products and the like containing unsaturated hydrocarbons mainly of the olefine type such as cracked gasolene are treated with sulphuric acid having a specific gravity of 1·57 to 1·84. An acid liquor containing sulphated derivatives of olefines is produced in which the sulphate radical may be replaced by other groups or radicals to yield products such as monohydric alcohols, esters or the like. The temperature is kept at 10° to 20° C. by cooling coils, and the acid is preferably sprayed into the oil so that excessive local temperatures are avoided. If gasolene containing a high proportion of di-olefines and other highly unsaturated material is used, it may be subjected to a preliminary treatment with 0·5 per cent. of 66° Be. sulphuric acid and the sludge removed. The remainder is then treated as above. The liquor obtained may be separated from the residual hydrocarbon by settling or by centrifugal apparatus and then subjected to further treatment. When water or other hydrolysing agent is added and the mixture distilled, monohydric alcohols are obtained. Water-insoluble portions of the alcohols may be separated from the hydrocarbons by adding sulphuric acid of a specific gravity about 1·57, in which the alcohols are soluble but the hydrocarbons are not. The reactive acid liquor may alternatively be treated with an organic acid or a salt of such acid for the production of esters which may be separated by distillation. Reference is directed in pursuance of Section 7, Subsection 4, of the Patents and Designs Acts 1907 and 1919 to Specifications 13,441/1913, 115,014 and 119,441.

160,200. HYDROCARBON OILS, CRACKING. R. C. Holmes, 155, Riverside Drive, New York, and F. T. Manley, Savoy Apartment, Houston, Tex., U.S.A. Application date, October 8, 1919.

A series of vertical stills 1, 2, 3, 4, are arranged in a furnace in such a way that both ends project outside the furnace and the middle zones are subjected to high temperatures. The stills are connected by pipes 33, 34, 35, at the surface level of the oil, and by pipes 36, 37, 38 between the vapour spaces. The stills are connected at the bottom to the heat exchanger 10 through which passes the pipe 45 supplying the fresh oil. A separator 6 comprises two pairs of drums 56 connected by



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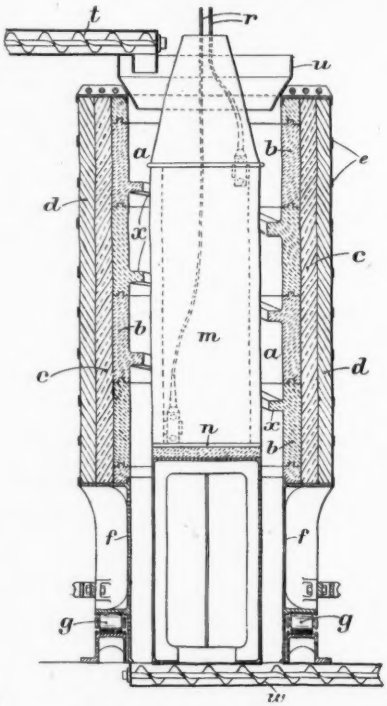
vertical tubes 57, one end of the separator being connected by a pipe 58 to the vapour space of the still 4 and the other end by a pipe 61 to a condenser 62. The outlet end of the condenser is connected to a receiver 8 provided with a liquid gauge and outlet fittings. The walls of the stills are kept free from carbon deposits by rotating scrapers 72, the shafts of which are surrounded by sleeves 75 through which oil is circulated by a pump 76. Leakage of vapour around the shafts is prevented by maintaining an oil pressure slightly higher than the pressure in the stills. The pressure is maintained at 150-200 lbs. per sq. inch in the stills, and the temperature in all the stills is kept substantially uniform by a constant supply of the oil by means of the pump 9. Heavier products are condensed in the separator 6 and returned to the bottom of the still 1, and lighter products are recovered in the condenser 62. The heavier residual oil is withdrawn from any or all of the stills 2, 3, 4, but not from the still 1 in which less cracking takes place.

160,225. CELLULOID PRODUCTS, MANUFACTURE OF. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, December 3, 1919.

In the manufacture of plastic substances from cellulose acetate, a "plastifier" and a volatile diluent, difficulty is experienced in mixing the ingredients owing to the irregular solvent action of the volatile liquid and "plastifier" on the cellulose acetate, and the object is to avoid this difficulty. This is effected by the use of a large quantity of a volatile liquid such as ethyl or methyl alcohol, which are not solvents of cellulose acetate and which dilute the high boiling "plastifiers" to such an extent that their solvent action on the cellulose acetate is small and a uniform mixture can be obtained. The volatile liquid may then be evaporated or expelled. As an example 100 parts of cellulose acetate may be treated with 30 parts of mixed isomeric xylene mono-ethyl or mono-methyl sulphonamides and 200 parts of ethyl and/or methyl alcohol. In another example, 100 parts of cellulose acetate may be treated with 25 parts of toluene-*o*-monoethyl sulphonamide or mixture of *o* and *p*-monoethyl or monomethyl sulphonamides, and 150 parts of benzene. This example is more particularly for electric insulation in which moisture must be avoided.

160,231. MAGNESIA, ELECTRIC FURNACES FOR CALCINING— AND FOR SIMILAR PURPOSES. F. S. Newall, Castle Hill, Wylam-on-Tyne, Durham. Application date, December 9, 1919.

A furnace *a* is built up of vertical fire clay blocks *b* enclosed



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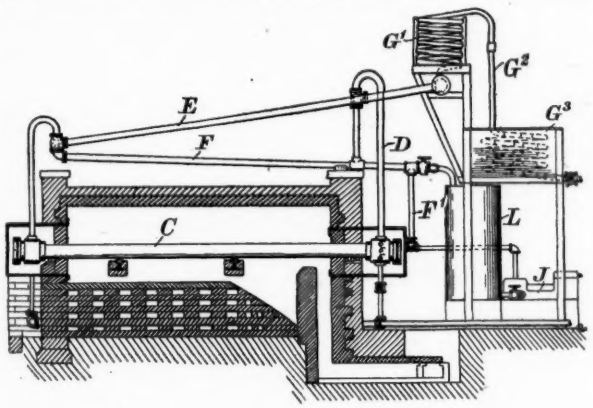
in a heat insulating casing *c* and finally by brickwork *d*. The furnace is mounted on a carrier *f* which may be rotated on rollers *g*. A resistance element *m* of graphite or carbon is

provided with connecting leads *r* and is mounted on an insulating base *n*. Magnesium carbonate or other substance is charged into the hopper *u* by the conveyor *t* and travels downwards over the helical rib *x* so that it is in contact with the resistance element, and is completely calcined on reaching the bottom. The furnace *a* is rotated or vibrated continuously or intermittently to assist the downward movement of the magnesia and the calcined product is finally discharged by the conveyor *w*.

160,236. CONVERTING HEAVY INTO LIGHTER HYDROCARBONS. L. W. Goold, Birmingham. (From Universal Oil Products Co., 208, South La Salle Street, Chicago, Ill., U.S.A.). Application date, December 12, 1919.

Heavy oil is supplied by a pump *J* to a series of horizontal 4-inch cracking tubes in a furnace, from which it passes to a series of 10-inch vaporising tubes *C* in a similar adjoining furnace, so that these tubes are only partly filled with oil and



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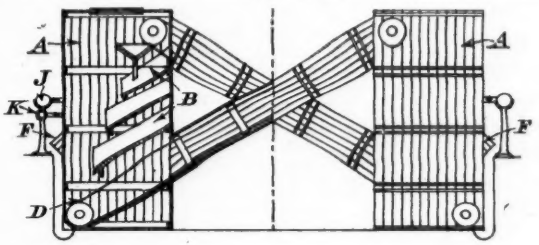
vapour is liberated. The vapour passes upwards through the tubes *D*, *E* to an air condenser G^1 and any condensate drains back through the tubes *E*, *F*, F^1 to the cracking tubes. The vapour passes on through the pipe G^2 to the water condenser G^3. The tubes *C* are not strongly heated and may alternatively be merely heat insulated. The condensate from the condenser G^1 may be wholly or in part drawn off to the tank *L* instead of returning to the cracking tubes.

160,258. CONDENSATION OF PHENOLIC BODIES WITH ALDEHYDIC COMPOUNDS. Vickers, Ltd., Vickers House, Broadway, Westminster, The Ioco Rubber & Waterproofing Co., Ltd., and W. H. Nuttall, Netherton Works, Anniesland, Glasgow. Application date, December 15, 1919.

Phenols are condensed with formaldehyde or the like by the use of a catalytic agent, consisting of one or more salts and/or one or more double compounds of hexamethylene-tetramine, the proportions being such that the quantity of hexamethylene-tetramine does not exceed 2 per cent. of the main ingredients of the composition. The salts used may include the chloride, sulphate, acetate, tartrate, citrate, benzene sulphonate, toluene-*p*-sulphonate, camphorate, arsenate, trimetaborate, salicylate, sulpho-salicylate, phthalate, perchlorate chromate, sulpho-cyanide and tannate. The double compounds are those with phenols such as phenol, resorcinol, pyrogallol and guaiacol, or with halogenated compounds such as ethyl bromide, chloral, bromine iodide, ethyl iodide, and iodoform or with metallic salts such as aluminium acetate, potassium antimony tartrate, sodium acetate, ferric chloride, and mercuric chloride. An example is given of the use of hexamethylene tetramine pyrogallol.

160,395. WHITE LEAD, APPARATUS FOR THE MANUFACTURE OF. E. W. Dahl, 101, Streathbourne Road, Balham, London, S.W. 17. Application date, July 2, 1920.

The object is to produce white lead of the same quality as that obtained by the stack process. The metal and dilute acetic acid are charged through a hopper *F* into a chamber *A*, and are transferred from the bottom by a travelling belt *D* to the top of another similar chamber where they fall on to baffle plates *B*, and are exposed to the action of carbon dioxide, air, and steam supplied through the pipes *J*, *K*. The mixture



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is then returned to the top of the first chamber by another travelling belt, as shown.

NOTE.—The following specifications which are now accepted, were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 139,803 (Chemical Construction Co.) relating to superphosphate of lime and similar compounds, see Vol. II., p. 537; 143,891 (Chemische Fabrik Griesheim Elektron) relating to acetaldehyde from acetylene, see Vol. III., p. 163; 144,604 (Fabriques de Produits Chimiques de Thann et de Mulhouse) relating to borneol, see Vol. III., p. 213; 145,058 (Badische Anilin & Soda Fabrik) relating to synthetic ammonia, see Vol. III., p. 243.

International Specifications not yet Accepted

158,252. TAR OILS, &C., PURIFYING. O. T. Otto, 3, Ewaldistrasse, Cologne, Germany. International Convention date, January 17, 1920.

To convert tar oils into lubricating oils, they are first treated with caustic potash or other alkali, and water glass, to remove creosote, phenols and resins, and then treated with aluminium acetate.

158,512. SYNTHETIC TANNING AGENTS. Elektrochemische Werke Ges., 35, Dorotheenstrasse, Berlin, and H. Bosshard and D. Strauss, Bitterfeld, Germany. International Convention date, August 9, 1918.

Naphthalene, retene, carbazole or the like is heated with glycollic acid and sulphuric acid, or naphthalene sulphonic acid is heated with glycollic acid *in vacuo* to produce tanning agents.

158,513. COKING PEAT. Torfverwertungsges Dr. Pohl and Von Detwitz (formerly Torfverwertung Dr. Pohl Komm.-Ges.), Villa Hacker, Planegg, Germany. International Convention date, January 22, 1920.

Raw peat is placed in a cylindrical container provided with horizontal heating tubes through which superheated steam is passed, or which may contain electrical heating devices. The temperature is regulated so that the peat is heated more strongly in the lower part of the container than in the upper, and the generation of steam increases the pressure to 6-8 atmospheres. A discharge pipe in the lower part is then opened and the fall of pressure causes a further generation of steam, which is withdrawn. This process is repeated until the water content has been reduced to the required extent—*e.g.*, 30 per cent.—the maximum temperature used being 200°C. The whole mass is then coked under pressure or *in vacuo* by the use of other heating elements.

158,533. BORNEOL. Fabriques de Produits Chimiques de Thann et de Mulhouse, Thann, Alsace. International Convention date, February 4, 1920. Addition to 144,604. (See THE CHEMICAL AGE, Vol. III., p. 213.)

Specification 144,604 describes the manufacture of borneol by heating oil of turpentine with tetrachlorphthalic acid and hydrolysing the ester. It is now found that the production of bornyl tetrachlorphthalate is facilitated by adding an ether such as anisol, a ketone, an aromatic ester, or like organic solvent.

LATEST NOTIFICATIONS.

161,542. Liquid-fuel burners. Erickson, D. E. April 9, 1920.
161,560. Process of collecting and purifying minerals. Trent Process Corporation. April 9, 1920.
161,564. Cellulose derivatives and process of preparing same. Little, Inc., A. D. April 10, 1920.

161,569. Hydraulic turbines. Moody, L. F. April 13, 1920.
161,519. Apparatus for suppressing upper harmonic currents in metal vapour rectifiers fed through polyphase transformers. Akt. Ges. Brown, Bouverie, et Cie. April 10, 1920.
161,570. Devices for vaporizing liquid fuel of slow volatilization. La Court, A. F. De. April 13, 1920.
161,192. Electro fining glass furnace. Clark, W. G., and Brunner, L. N. April 6, 1920.
161,193. Filter-presses. Valley, H. A. March 6, 1915.
161,195. Synthesis of ammonia. Soc. L'Air Liquide, Soc. Anon Pour L'Etude et L'Exploitation Des Procédés S. Claude. April 7, 1920.
161,527. Destructive distillation of coal. Macintosh, A. A. April 8, 1920.
161,537. Treatment of copper alloys. Isabellenhuette Ges. April 10, 1920.
161,539. Manufacture of α-dialkylamino-ethyl-β-aracyl oxybutyric acid esters. Farbwerke Vorm. Meister, Lucius, and Brüning. April 10,1920.

Specifications Accepted, with Date of Application

16,597/1915. Metal hydroxides, Manufacture of. Buchner November 24, 1915.
137,288. Metallic lead into oxides, Method of converting. J. A. Thibault. December 30, 1918.
139,172. Sulphur dioxide from blast furnace slag, Method and arrangement for obtaining and utilising. L. H. Diehl. January 16, 1917.
143,500. Porous material, Manufacture of. Norske Aktieselskab for Elektrokemisk Industri Norsk Industri Hypotekbank. May 16, 1919.
144,266. Caustic soda or soda lye, Process for the production of. Schweizerische Sodafabrik. June 4, 1919.
156,080. Dichlorethylene, Manufacture of. Dr. A. Wacker Ges. für Elektrochemische Industrie. December 23, 1919.
160,847. Phosphates, Manufacture of assimilable. J. J. Morel. August 14, 1920.
160,848. Hydroxy-azo dyes, Manufacture of . G. T. Morgan and British Dyestuffs Corporation, Ltd. July 17, 1919.
160,853. Arylsulphonyl and arylenedisulphonyl derivatives of 1:4-naphthylenediamine and its sulphonic acids. G. T. Morgan and Imperial Trust for the Encouragement of Scientific and Industrial Research. August 6, 1919.
160,857. Urea or ammonia from cyanamide, Production of. S. Giertsen. August 14, 1919.
160,892. Saponaceous compositions, Manufacture of. F. G. Chadbourne. December 1, 1919.
160,907. Converting liquid hydrocarbons into hydrocarbons of lower boiling point, Process of. W. M. McComb. December 24, 1919.
160,990. Cooling towers. L. R. Moorshead. January 17, 1920.
161,103. Treating solid substances capable of reaction with a gaseous reagent, Process of. E. C. R. Marks. (*Ore Roasting Development Co.*). July 6, 1920.

Applications for Patents

Beyer, R. Process for impregnating and dyeing porous materials 10,613. April 11.
Busch, A. Burners for burning metaldehyde. 10,598. April 11.
Chemische Fabrik Griesheim-Elektron. Manufacture of stable compounds containing active oxygen and calcium. 10,771. April 13.
Dehn, F. B. (McComb). Process of converting heavy liquid hydrocarbons or liquid hydrocarbons of higher boiling point into lighter hydrocarbons or hydrocarbons of a lower boiling point. 11,116. April 16.
Frentrup, H. Process of increasing consistency of hydrocarbon oils, &c. 10,692. April 12.
Johnston, G. Machines for centrifugally separating solids from liquids. 10,901. April 14.
Kiederich, P. Process of increasing the consistency of hydrocarbon oils, &c. 10,692. April 12.
Koppers Co. Purification of phenol-contaminated liquors. 10,603. April 11. (United States, April 30, 1920.)
Meyer zu Eissen, H. Process of increasing the consistency of hydrocarbon oils, &c. 10,692. April 12.
Mirat, G., and Piperaut, P. Manufacture of sulphuric acid. 10,792. April 13. (Belgium, May 6, 1920.)
Pease, E. L. Manufacture of compounds of ammonia, &c. 11,039. April 15.
Pistor, G. Manufacture of stable compounds containing active oxygen and calcium. 10,771. April 13.
Plauson, H. Manufacture and treatment of viscose. 10,615. April 12.
" Compositions of oils or other orgonic substances. 10,616. April 12.
" Manufacture of viscous oily compositions. 10,852. April 13.
Reitz, H. Manufacture of stable compounds containing active oxygen and calcium. 10,771. April 13.
Trent Process Corporation. Process of separating oils. 10,828. April 13. (United States, August 11, 1920.)
" Process of manufacturing combustible gas. 10,829. April 13. (United States, August 31, 1920.)
" Process of reducing ores. 10,830. April 13. (United States, October 4, 1920.)

Patents Court Cases

AN application has been made under Rule 7 of the Patents (Treaty of Peace) Rules, 1920, by Scottish Dyes, Ltd., Murrell Hill Works, Carlisle, for a licence in respect of Patent 8,230/1912 which is in the name of J. Y. Johnson (Badische Anilin & Soda Fabrik). It relates to the manufacture of compounds of the anthracene series. Any notice of opposition must be given by May 12, 1921.

A similar application has been made by Boot's Pure Drug Co., Ltd., Station Street, Nottingham, in respect of a series of patents relating to drugs containing organic compounds of arsinic acids, and held by Farbwerke vorm. Meister Lucius & Brüning. Any notice of opposition must be given by May 13, 1921.

An application has been made by Leopold Cassella & Co. Ges.m.b.H., under Sec. 20 of the Patents and Designs Acts, 1907 and 1919, for the restoration of lapsed patent 9,689/1909, dated April 23, 1909, and granted to R. B. Ransford, as a communication from Leopold Cassella & Co. It relates to derivations of carbazole and dyestuffs formed therefrom. Any notice of opposition must be given by June 13, 1921.

German Dye Patents

Liquidator Receives Permission to Sell

THE Official Receiver, as the liquidator of the Mersey Chemical Works, Ltd., under the Trading with the Enemy Acts, applied to Mr. Justice Russell, in the Chancery Division, on April 15, for a decision as to whether he was in a position to sell certain letters patent which were worked by the company.

Mr. CLAUSEN, K.C., for the Board of Trade, said the point was that a number of patents originally belonging to three German dye manufacturing companies were assigned to the Mersey Chemical Works, Ltd. They contained provisions under which the German companies received a percentage of the profits that were made, and if the output of the works was not sufficient to meet the requirements of the British markets the German companies had the right to import dyestuffs into this country, notwithstanding the assignment of the patents. The object of the application was to get a decision as to whether the liquidator could make a good title to a purchaser of the patents, so as to exonerate the purchaser from any claim by the German company.

Mr. J. HUNTER GRAY, K.C., representing the three German companies concerned (the Bayer Co., the Badische Co., and the Berlin Aniline Co.) submitted that a good title could not be given, as the whole interest in the patents was not vested in the Mersey Chemical Works, Ltd.

His LORDSHIP, in giving judgment, said it was contended on behalf of the German companies that what the Mersey Company took under the assignment of the patents was something which fell short of a full assignment in that it allowed the German companies the right to import. He did not take that view, but held that the right was merely in the nature of a licence, and as such was cancelled by virtue of the Treaty of Peace. He therefore made a declaration that the Official Receiver was in a position to sell and assign the full beneficial interest in the patents free from any liability to claims by any other person.

At the annual meeting of the Society of Glass Technology, held on Wednesday, Dr. Morris W. Traves was elected PRESIDENT FOR THE ENSUING YEAR. A paper on "Automatic Glass Feeding Devices" was discussed.

Considerable DAMAGE WAS CAUSED BY A FIRE which broke out on Tuesday night at the premises in North-East Thistle Street Lane, Edinburgh, of Pinkerton, Gibson & Co., Ltd., manufacturing chemists and druggists.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, APRIL 21.

Whilst the labour situation shows a decided improvement on the week, the coal strike remains, and the paralysis of business deepens with the passage of time. The demand for most products is purely nominal, and it is most unfortunate that the labour crisis should have developed at the time when business seemed to be slightly on the mend. The export market remains uninteresting.

General Chemicals

ACETONE remains in considerable enquiry, and the firmer tendency is fully maintained. Stocks are passing steadily into consumption, and the export demand is satisfactory.

ACID ACETIC is rather firmer in price, but demand is slow.

ACID CITRIC has been more enquired for, and the on-coming season, combined with the improved value of the lire, indicates the probability of better prices.

ACID FORMIC is slow, but unchanged in price.

ACID OXALIC is in good enquiry, but the volume of business can be improved upon; the price is fully maintained.

ACID TARTARIC should be firmer in sympathy with the lire, but forced realisation of stocks impedes an improvement.

BLEACHING POWDER is only in nominal demand, and continues on offer at low prices from the Continent.

COPPER SULPHATE should be influenced by the improvement in the metal, but orders are few and far between.

FORMALDEHYDE is again firmer, and stocks are nominal.

LEAD ACETATE is in very poor demand. The price is nominally unaltered.

POTASH BICHROMATE remains a second-hand market and favours buyers.

POTASH CAUSTIC is little enquired for, and no business of importance is reported.

POTASH PRUSSIATE has been in better demand, and the price is higher.

SODA ACETATE is firmer in tone, but the volume of business is small.

SODA BICHROMATE continues to be influenced in a downward direction by forced realisations.

SODA CAUSTIC.—There is no improvement in demand, and the trade is stagnant.

SODA HYPOSULPHITE is lower in price and only in moderate enquiry.

SODA NITRITE maintains its firmer position, with stocks passing slowly into consumption.

SODA PRUSSIATE remains easy in price, with little business passing.

Coal Tar Intermediates

There has been a slightly more satisfactory feeling in the market during the current week, although, of course, the miners' strike militates largely against business. Prices are well maintained, however, and the undertone is quite healthy.

ALPHANAPHTHYLAMINE is steady, but only a small business is passing.

ANILINE OIL AND SALT is in slightly better demand at current figures.

ALPHA NAPHTHOL is in moderate request and the value is well maintained.

BETA NAPHTHOL is quietly steady with little business to report.

DIMETHYANILINE is in better request, and one or two export orders have been reported.

DINITROPHENOL is scarce and the price is firm.

NITROBENZOLE is moving off steadily and is without change in value.

PARANITRANILINE is idle.

PARATOLUIDINE is occasionally called for, and is without change in value.

RESORCINE maintains its price on a quiet market.

SALICYLIC ACID is very firm, and an early advance in price is to be looked for.

Coal Tar Products

The market is still under the influence of the coal strike, and consequently somewhat irregular, but on the whole, owing to the poor demand for nearly all products, prices remain almost unaffected.

90's BENZOL is still quoted at 2s. 10d. in the North and 3s. in the South.

PURE BENZOL is quoted 2s. 11d. in the North and 3s. 1d. to 3s. 2d. in the South.

CREOSOTE OIL business has been done at 7½d. in the North, but sellers in the South still ask 9d. to 9½d. per gallon.

CRESYLIC ACID.—There is a little more active demand, but prices are unchanged.

SOLVENT NAPHTHA.—The demand remains slow, and the price quoted is 1s. 10½d. to 2s. per gallon.

HEAVY NAPHTHA is somewhat scarce, but remains quiet at 2s. 2d. to 2s. 3d. per gallon on rails.

NAPHTHALENE is slow of sale at from £9 to £13 per ton for Crude and £18 to £23 per ton for Refined.

PITCH.—The market remains disturbed owing to the continuance of the coal strike, and prices are more or less nominal at about 60s. f.o.b. East Coast, and about 70s. f.o.b. London.

SULPHATE OF AMMONIA.—There are no new features to report.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	6	to	0	2	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	95	0	0	to	100	0	0
Acid, Acetic, glacial, 99-100%	ton	70	0	0	to	72	0	0
Acetic, 80% pure	ton	53	0	0	to	54	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst	ton	69	0	0	to	70	0	0
Carbolic, cryst. 39-40%	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	2	6	to	0	2	8
Formic, 80%	ton	80	0	0	to	85	0	0
Gallic, pure	lb.	0	4	9	to	0	5	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	37	10	0	to	40	0	0
Lactic, 60 vol.	ton	42	10	0	to	45	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	0	10	to	0	0	11
Phosphoric, 1.5	ton	55	0	0	to	57	0	0
Pyrogallic, cryst	lb.	0	8	3	to	0	8	6
Salicylic, Technical	lb.	0	1	0	to	0	1	2
Salicylic, B.P.	lb.	0	1	6	to	0	1	9
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	9	to	0	1	10
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	45	0	0	to	50	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	13	0	0	to	14	0	0
Aluminium, sulphate, 17-18%	ton	15	5	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	65	0	0	to	70	0	0
Ammonia, muriate (galvanisers)	ton	55	0	0	to	57	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	95	0	0	to	100	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	55	0	0	to	60	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0

	per	£	s.	d.		£	s.	d.
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	20	0	0	to	21	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	20	0	0	to	21	0	0
Borax crystals	ton	34	0	0	to	36	0	0
Calcium acetate, Brown	ton	12	0	0	to	13	0	0
,, Grey	ton	19	0	0	to	21	0	0
Calcium Carbide	ton	29	0	0	to	30	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	90	0	0	to	92	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	11	6	to	0	12	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	35	0	0	to	37	0	0
Cream Tartar, 98-100%	ton	140	0	0	to	150	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	120	0	0	to	122	10	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts, commercial	ton	6	0	0	to	7	0	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	50	0	0	to	52	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	55	0	0	to	57	0	0
Litharge	ton	38	10	0	to	40	0	0
Lithopone, 30%	ton	30	0	0	to	32	10	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	10	10	0	to	11	10	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	75	0	0	to	78	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	ton	145	0	0	to	150	0	0
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	48	0	0	to	50	0	0
Potassium bichromate	lb.	0	0	9½	to		—	
Carbonate, 90%	ton	55	0	0	to	60	0	0
Chloride	ton	38	0	0	to	40	0	0
Chlorate	lb.	0	0	8½	to	0	0	9
Meta bisulphite, 50-52%	ton	200	0	0	to	210	0	0
Nitrate, refined	ton	50	0	0	to	52	0	0
Permanganate	lb.	0	2	0	to	0	2	3
Prussiate, red	lb.	0	2	6	to	0	2	9
Prussiate, yellow	lb.	0	1	6	to	0	1	7
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt	3	15	0	to		—	
Seconds	cwt	3	10	0	to		—	
Sodium acetate	ton	35	0	0	to	37	10	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	7½	to	0	0	8
Bisulphite, 60-62%	ton	37	10	0	to	40	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	22	0	0	to	24	0	0
Nitrite, 96-98%	ton	50	0	0	to	52	0	0
Phosphate, crystal	ton	25	0	0	to	27	0	0
Perborate	lb.	0	1	9	to	0	2	0
Prussiate	lb	0	0	8½	to	0	0	9
Sodium Sulphide, crystals	ton	20	0	0	to	23	0	0
Sulphide, solid, 60-62%	ton	40	0	0	to	41	0	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Strontium Nitrate	ton	90	0	0	to	95	0	0
Strontium Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	2	3	to	0	2	6
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb.	0	1	8	to	0	1	9
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	45	0	0	to	47	10	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	4	6	to	0	4	9
Alphanaphthylamine	lb.	0	3	0	to	0	3	3
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	4	9	to	0	5	0
Benzidine, base	lb.	0	11	6	to	0	12	0
Benzidine, sulphate	lb.	0	10	0	to	0	10	6
Benzoic acid	lb.	0	2	3	to	0	2	6
Benzoate of soda	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	8	0	to	0	8	6
Betanaphthol	lb.	0	3	0	to	0	3	3
Betanaphthylamine, technical	lb.	0	9	6	to	0	10	0
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	3	0	to	0	3	3
Dimethylaniline	lb.	0	5	0	to	0	5	3
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	10	0	to	0	10	6
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	0
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	0	to	0	5	6
Nitronaphthalene	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	4	to	0	1	5
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	5	9	to	0	6	0
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	3	to	0	8	6
Phthalic anhydride	lb.	0	4	9	to	0	5	6
Resorcin, technical	lb.	0	7	6	to	0	8	0
Resorcin, pure	lb.	0	8	9	to	0	9	0
Salol	lb.	0	3	6	to	0	3	9
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9

Cardiff By-Products

CARDIFF, APRIL 20.

Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£24 11s. 0d.
For export (per ton f.o.b.)	£20 to £30
National Benzole (per gallon)	3s. to 3s. 6d.
Motor Benzole (per gallon)	3s. to 3s. 5d.
Crude Benzole (per gallon)	1s. 9d. to 2s.
Solvent Naphtha (per gallon)	2s. 5d. to 2s. 7d.
Heavy Naphtha (per gallon)	2s. 9d. to 2s. 11d.
Crude Naphthalene Salts (per ton)	£9 to £15
Pitch (per ton)	80s. to 100s.
Creosote (per gallon)	10d. to 11d.

Swedish Cellulose Industry

Workers Strike Against Wage Reductions

A STRIKE is in progress at a large number of Swedish Cellulose factories, owing to the fact that the workmen have not been willing to accept the reduction in wages, considered by the manufacturers to be necessary owing to general trade depression. At the present time, states *Swedish Export*, work is entirely suspended at 16 sulphite factories and 8 sulphate factories representing an annual output of 315,000 tons of sulphite and 108,000 tons of sulphate. This corresponds to a reduction of 1,050 tons of sulphite and 360 tons of sulphate per working day, or 46 per cent. of the sulphite, and 55 per cent. of the sulphate produced for sale. At the instance of the Government, however, new negotiations have been begun with the workmen, but it is doubtful, states our contemporary, whether they will lead to any result.

Company News

MEXICAN PETROLEUM.—Cable advices from New York state that the issue of $10,000,000 15-year 8 per cent. sinking fund convertible debentures of the Mexican Petroleum Co., Ltd., offered by Messrs. Blair & Co. at 98½, has been a complete success, having been largely over-subscribed. These debentures are guaranteed as to principle and interest by the Pan American Petroleum & Transport Co.

BORAX CONSOLIDATED.—The directors have declared a dividend of 6 per cent. per annum, less tax, on the preferred ordinary shares for the half-year to March 31. Coupon No. 27 of preferred ordinary share warrants and half-yearly Coupon No. 44 of preferred share warrants will be paid, less tax, on and after May 2, at 16, Eastcheap, E.C.3. Transfer books will be closed from April 18 to 30.

W. CANNING & CO.—The first annual general meeting of W. Canning & Co., factory requisites and chemical manufacturers, &c., of Birmingham, was held on April 15, Mr. Ernest R. Canning presiding. The profits amounted to £37,853, and although this was substantially below the results of 1918 and 1919, it was £2,700 above the five years' average mentioned in the prospectus. The amount for disposal was £14,397. The sales in 1920 were the largest in the history of the business.

YORKSHIRE INDIGO.—The report for 1920 of the Yorkshire Indigo, Scarlet and Colour Dyers, states that the profit amounted to £27,828, and £6,758 was brought in, making £34,586. Interest on debenture stock for year absorbed £4,573, leaving £30,013. Dividend of 1s. and bonus of 6d. per share on preference, and 6d. and bonus of 3d. per share on ordinary, less tax; to reserve £4,395 and £8,149 forward. The business of Henry Fawcett, indigo dyer, Kirkstall-road, Leeds, has been purchased as from January 1, 1921. Meeting, Atlas Chambers, King Street, Leeds, April 29, noon.

BEDE METAL & CHEMICAL.—Operations for 1920 resulted in a loss of £2,950. Deduct profit balance brought in, £1,504; debit carried forward, £1,446. When the year commenced the directors expected it would show fair profits, but by July a marked depression of the copper manufacturing trade set in, and from then onwards they were only able to dispose of a fraction of the quantity of the company's copper output normally consumed. Further, a marked decline in the copper market took place during June, and by the end of the year the price of ingot copper had fallen £25 per ton.

RIO TINTO CO.—For the year 1920, after deducting taxes, cost of administration, hospitals, pensions, &c., from profit on sales of produce and other revenue credits, there is a balance of £108,169, and £348,671 was brought in, making £456,840. The interim dividend of 2s. 6d. per share on preference shares absorbed £40,625, leaving £416,215. The directors now recommend a final dividend of 2s. 6d. per share, less tax, on preference, absorbing £40,625; carried forward, £375,590. The annual meeting was held yesterday at 3, Lombard Street, E.C.

LEVER BROTHERS.—A trust deed, dated April 11, 1921, to secure £15,000,000 debenture stock, has been registered by Lever Brothers, Ltd. The property charged consists of "Port Sunlight," certain lands and buildings in Newcastle, Manchester, Leeds, West Bromwich, Bromborough, London, and elsewhere, &c., and the company's undertaking and general assets, present and future, including uncalled capital. The trustees for the debenture holders are the London County Westminster & Parr's Bank, Ltd., and Barclays Bank, Ltd. Three per cent. underwriting commission is payable on the first issue of £4,000,000.

THARSIS COPPER & SULPHUR.—The report for 1920 states that the total quantity of ore raised from the Tharsis and Calañas mines during the year was 313,918 tons, against 260,801 tons in 1919. The metal works have been well employed throughout the year, the quantity of ore treated having only been twice exceeded in the history of the company. The net profit, including £23,457 brought in, amounts to £158,406. The directors recommend a dividend of 6s. per share, equal to 15 per cent., less tax, payable May 10, leaving to be carried forward £27,156. Dividend will be paid to holders of nominative shares by warrants payable at the Bank of Scotland, London, and to holders of Coupon No. 38 at the head office in Glasgow. These coupons may be transmitted direct or through any banker. Five clear days are required for examination.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Winnipeg ...	Olive oil	461
Toronto ...	Glassware	469
Egypt ...	Oil, colza, and oil rape. Particulars obtained at the office of the Inspecting Engineer to the Egyptian and Sudanese Governments, Queen Anne's Chambers, Broadway, Westminster, London, S.W.1.	—
Egypt ...	Drugs	—
Egypt ...	Coal tar	—
Liege ...	Industrial oils	498
Utrecht ...	Fine chemicals	509
Mexico City ...	Photographic materials	517

Tariff Changes

BRITISH INDIA.—Revised Customs duties, which became operative on March 1, were given in full in the Board of Trade *Journal* (April 14, pp. 411–415). Among the articles which are liable to import duty at special rates are patent fuel, petroleum and certain other oils, and opium, its alkaloids and their derivatives. Green copperas is liable to an *ad valorem* duty of 2½ per cent. An 11 per cent. *ad valorem* duty is imposed on oils not included in the special duty rate; blasting gunpowder, blasting gelatine; blasting dynamite, blasting roburite, blasting tonite, and all other sorts of explosive, including detonators and blasting fuze, various chemicals and drugs, all kinds of dyeing and tanning substances, paints and colours, perfumery, pitch, tar and soap.

AUSTRALIA.—The duties on soda ash and caustic soda, which were to have come into force on January 1, 1921, have been deferred until October 1.

BELGIUM.—The import duty on alcoholic perfumery and other perfumery not specially classified is now fixed at 20 per cent. *ad valorem*. Revised coefficients of increase of import duties on the following and other articles are given in detail in the Board of Trade *Journal* (April 14, pp. 417–9). Gunpowder, carbonic acid (liquefied), acetic ether and sulphuric ether.

FRANCE.—Coefficients of increase are notified in respect to celluloid, crude, in lumps, sheets, leaves, not worked and in tubes, canes, rods, &c.; celluloid in sheets, polished, dulled, coloured or worked in any manner; and small wares of celluloid.

GERMANY.—Oleomargarine and premier jus may be imported without licence.

GREECE.—The importation of caustic soda is now permitted.

Ammonium Chloride for Australia

H.M. SENIOR Trade Commissioner in Australia has forwarded copies of specifications, conditions and forms of tender in connexion with calls for tenders by the Postmaster-General's Department for the supply and delivery of 20½ tons of ammonium chloride (Schedule No. 1683). Sealed tenders on the proper forms will be received by the Deputy Postmaster-General, Melbourne, Victoria, up to the 31st May. Local representation is essential and as the time for the receipt of tenders is limited, it will be necessary for firms tendering to instruct their local agents by cable.

Copies of the specifications in connexion with the above tender may be consulted by British firms interested at the Department of Overseas Trade (Room 59), 35, Old Queen Street, Westminster, S.W.1.

BRUNNER, MOND & CO.—The company contradict a statement, current in certain quarters, that underwriting was proceeding on Wednesday for the issue of 2,500,000 7½ per cent. cumulative preference shares.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

First Meeting and Public Examination

ANILINE DYE & CHEMICAL CO., LTD., 32-34, Lucy Street, Hulme, Manchester. Creditors' meeting, April 28, 1921, 3 p.m. Official Receiver's Offices, Byrom Street, Manchester. Contributories' meeting, April 28, 1921. 3.30 p.m. Official Receiver's Offices, Byrom Street, Manchester.

ROBINSON, W., The Woodman Inn, Hartley Street, Dewsbury, York; ROBINSON, T., Crossley's Terrace, Street Side, Ossett; and WIGHTMAN, J., 4, Lawson Street, Eastborough, Dewsbury, under the style of Wilson, Robinson & Son, Albion Dye Works, Batley Carr, Batley, Yorks. Dyers. First meeting, April 26, 11 a.m. County Court House, Dewsbury. Public examination, May 5, 1921, 11 a.m.

Notices of Intended Dividends

BRITISH RUBBER MANUFACTURERS, LTD., Agnes Works, Agnes Road, Acton, Middlesex. May 2. Liquidator, Harold deVaux Brougham, Senior Official Receiver, 33, Carey Street, Lincoln's Inn, London, W.C.2.

DAVIS, H. J., 58, White Hart Lane, Barnes, Surrey, oil and colourman. May 2, 1921. Gowlay, T. Offices of the Official Receiver, 132, York Road, Westminster Bridge Road, London, S.E.1.

Company Winding Up

METALLIC CHEMICALS, LTD. A petition for the winding up by the High Court of Justice was on April 12 presented to the Court by A. Ruffer & Sons, 39, Lombard Street, London, creditors of the company, and will be heard before the Court sitting at the Royal Courts of Justice, Strand, London, on April 26. Watkins, Pulleyn & Ellison, 6, South Square, Grays Inn, London, W.C.1, solicitors for the petitioners. *Note.*—Any person who intends to appear on the hearing of the petition must notify the above named not later than 6 p.m. on April 25, 1921.

Companies Winding Up Voluntarily

HAY'S WATERPROOF GLUE & NEW PATENT ENAMEL COMPOSITION & VARNISH CO., LTD. (In voluntary liquidation.) A general meeting of members of the company will be held at 24A, Commercial Road, Portsmouth, on May 20, 1921, at 3 p.m. F. O. Goodman, liquidator.

INTERNATIONAL LABORATORIES, LTD. Miss E. F. Peachey, 10, Phœnix Place, Mount Pleasant, London, liquidator.

MINERAL OIL & POWER INVESTMENTS, LTD. (In voluntary liquidation.) A meeting of creditors will be held at 50, Pall Mall, London, S.W.1, on Monday, April 25, at 12.15 p.m. T. Whiteley, liquidator.

PETROLEUM ASSETS SYNDICATE, LTD. (In voluntary liquidation.) A meeting of creditors will be held at 50, Pall Mall, London, S.W.1, on Monday, April 25, at 12 noon. T. Whiteley, liquidator.

WIGAN ELECTRO-METALLURGICAL WORKS, LTD. A meeting of creditors will be held at office of Messrs. McAusland, Airey & Page, Produce Exchange Buildings, at 8, Victoria Street, Liverpool, on Wednesday, April 27, 3 p.m. J. Airey, 8, Victoria Street, Liverpool, liquidator.

Liquidators' Notices

AIDALL CHEMICAL CO., LTD. (in liquidation).—A general meeting of members will be held at 2, Austin Friars, London, E.C., on Tuesday, May 17, 1921, at 12 noon. T. Symington, Liquidator.

COAL BY-PRODUCTS (PARENT) SYNDICATE, LTD.—A general meeting will be held at Donington House (Third Floor), Norfolk Street, Strand, London, W.C. 2, on Wednesday, May 18, 1921, at 12 noon. A. W. Bellman, Liquidator.

CUBAN PETROLEUM CO., LTD.—A general meeting of members will be held at Finsbury Pavement House, Finsbury Pavement, London, on Monday, May 23, at 11 a.m. R. D. G. Morris, Liquidator.

FREMONT OIL CO.—A general meeting of members will be held at 58, Coleman Street, London, on Tuesday, May 31, at 12 noon. F. W. Pixley, Liquidator.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

ALBY UNITED CARBIDE FACTORIES, LTD., London, E.C.—Reg. April 8, £45,000 (not ex.) mortgage and a mortgage, by way of additional security, to C. Hoare & Co.; charged on hereditaments and premises, and plant, machinery, &c. *£132,917 1s. August 13, 1920.

BRADFORD DYERS ASSOCIATION, LTD.—Reg. March 21, substituted security (supplemental to Trust Deeds dated April 10, 1899, September 17, 1900, June 12, 1902, and January 30).

INTERNATIONAL RUBBER MANUFACTURING CO., LTD., London, S.W.—Reg. April 8, £20,000 second debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £19,500; general charge. *£40,000. December 31, 1920.

SURREY SOAPMAKERS, LTD., Chertsey.—Reg. April 11, £275 mortgage, to R. A. Burrows, 27, Chancery Lane, W.C., solicitor; charged on land and three cottages at Addlestone. *£250. December 30, 1920.

TRINIDAD NATIONAL PETROLEUM CO., LTD., London, E.C.—Reg. April 11, £60,000 debentures and a bonus of £6,000; general charge. *Nil. January 13, 1921.

Satisfactions

ALBY UNITED CARBIDE FACTORIES, LTD., London, E.C.—Satisfactions reg. April 11, £50,000, reg. June 10, 1908; and £75,000, reg. September 30, 1920.

BRITISH DYESTUFFS CORPORATION (BLACKLEY), LTD. (late LEVINSTEIN, LTD.).—Satisfaction reg. April 12, £120,000 outstanding, July 1, 1908.

SURREY SOAPMAKERS, LTD., Chertsey.—Satisfaction reg. April 11, £250, reg. July 31, 1914.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

MATTHEWS & SHAW, 19, Cowhill Lane, Ashton-under-Lyne, chemists. £13 19s. 8d. March 10.

SKEAT, C., 609, High Street, Tottenham, chemist. £17 16s. 5d. March 7.

WALL, F. W., Bristol House, Bishop's, Itchington, chemist. £20 5s. 3d. March 7.

INGLESON, H., 116, Meadow Lane, Leeds, soap manufacturer. £17 1s. 6d. March 9.

New French Tanning Material

REFERENCES have been made recently in the French Press to the value as a tanning material of the *Acacia arabica*. Fifty-five tons of this plant were imported into France between 1916 and 1918, and experiments made at the Laboratoire Général des Productions Coloniales showed that it could be used for tanning either alone or with sumac, quebracho, and oak bark. It would further appear that it might replace Sicilian sumac, of which 7,000 tons, to the value of more than two million francs, were imported into France during 1913. The plant is believed to grow abundantly in French West Africa.